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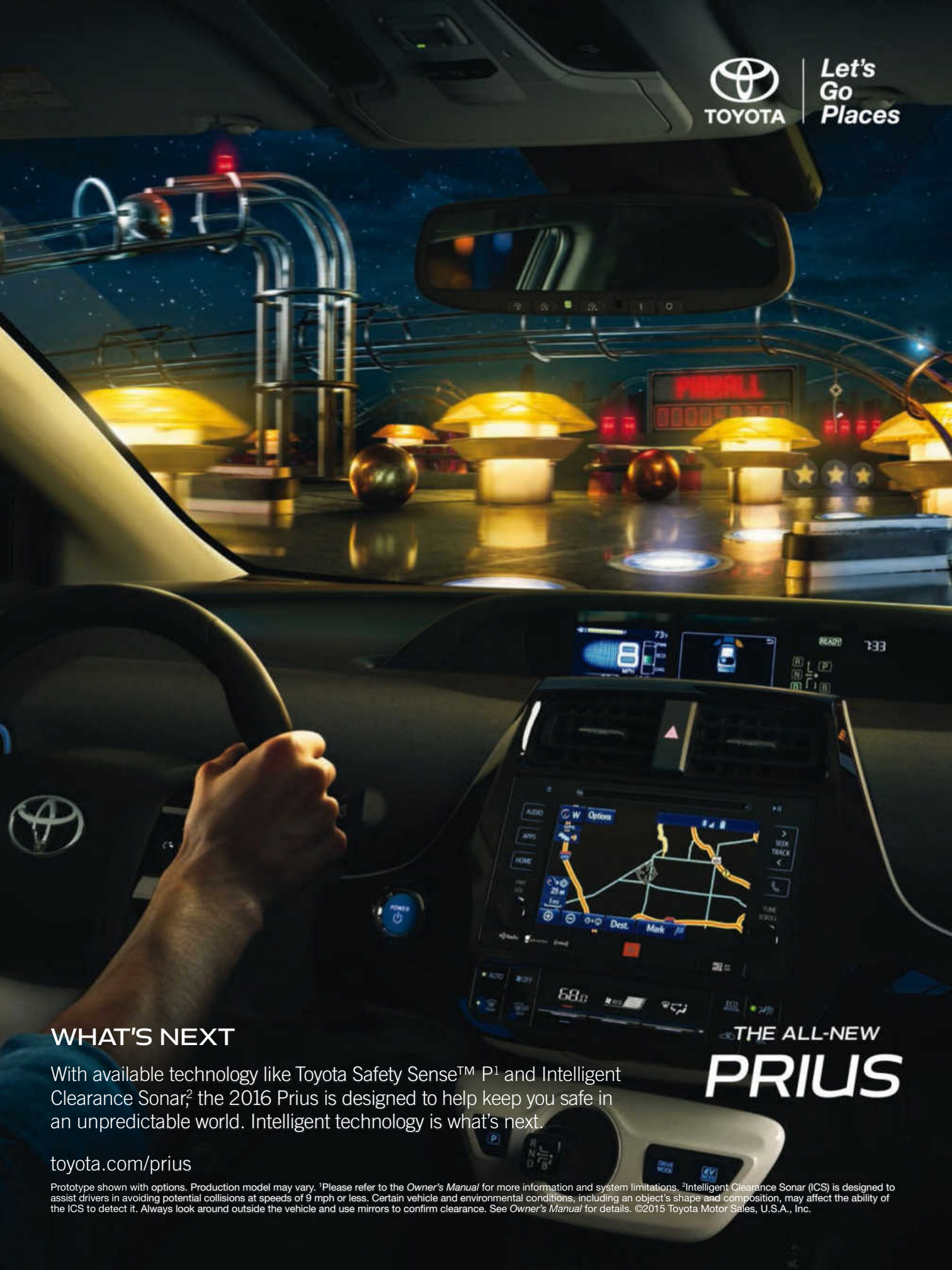
Hacking an Apple I, the computer that changed everything

THE SNOW LEOPARD'S VANISHING ACT

Photograph by Joel Sartore /
National Geographic Photo Ark



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Into Thin Air

An intrepid conservationist and her unlikely collaborators trek high into the mountains of Kyrgyzstan to conduct pioneering studies of the elusive snow leopard **BY MATTHEW SHAER**



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The story of the Mississippi farmer who led a revolt against the Confederacy is the subject of a new Hollywood movie—and ongoing controversy

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In Borneo, nomadic peoples are losing their rainforest home to rapacious commercial logging and the unquenchable global demand for palm oil

BY ALEX SHOUMATOFF

ABOVE: The snow leopard's speckled pelt makes the cat nearly invisible in its craggy mountain haunts, but it has not prevented the animal from becoming endangered.

Contributors



Richard Grant

A peripatetic British journalist whose first book was called *American Nomads*, Grant moved to Jackson, Mississippi, three years ago to work on his third book, *Dispatches From Pluto: Lost and Found in the Mississippi Delta* (Simon & Schuster). As he interviewed local residents for “The Raging Rebellion of Jones County” (p. 66), on the occasion of the new film starring Matthew McConaughey, it struck him that “people would slip easily into the present tense when talking about history. It was like the Civil War ended just a couple of years ago.”

William Widmer

Widmer is based in New Orleans and photographs all over the Southeast for the *New York Times*, the *New Yorker*, *Sports Illustrated* and other publications. “A lot of what I photograph is current,” says the onetime Chicagoan. “So it was unique for me to be in Jones County, thinking about what it looked like during the Civil War and wondering, ‘How do I make this look like a contemporary place, but also connect it to this history?’” (p. 66).



James Harkin

For his book *Hunting Season* (Hachette), about the rise of the Islamist terrorist group ISIS, Harkin worked extensively in Syria, and recalls encountering Syrians with precious artifacts stolen at the start of the civil war: “These guys were selling their own national treasure.” The Pulitzer Center on Crisis Reporting supported Harkin’s recent travels to Syria and Iraq for his dispatch, “Murdering History” (p. 38).

ILLUSTRATIONS BY **Bartosz Kosowski**

Clive Thompson

The *Smithsonian* columnist and author of *Smarter Than You Think* also writes regularly for the *New York Times Magazine* and *Wired*. In this issue Thompson does double duty with a column about the weird parallels between texting today and the advent of the telephone (“OMG! We’ve Been Here B4,” p. 23), and a second story about Apple’s first computer (“Power On,” p. 64). “I was 8 years old when the Apple I came to life,” says Thompson, who later plunged into computing on a Commodore VIC-20 borrowed from a friend of his father. Ever the early adopter, Thompson sent his first text in 1999 or 2000 and remains an enthusiastic texter, citing its value for “knowledge capture.” “Conversation is cool, but then vanishes into air.”



Claudia Kalb

An award-winning writer specializing in health and science whose work has appeared in *Newsweek* and *Scientific American*, Kalb has a new

book, *Andy Warhol Was a Hoarder: Inside the Minds of History’s Great Personalities* (National Geographic). On the centenary of George Gershwin’s musical debut, she considers that the composer may have had ADHD (p. 11). “People see Gershwin in their own family members, and it can be inspiring.”

Varial

Varial, a self-described nomadic photographer, has been working all over the world since 2010, and his pictures have received numerous prizes. When he first arrived in Borneo (p. 78), he was shocked by how much of the forest was gone—and concerned about the indigenous people who have long made the wilderness their home. “For some people, culture is territory,” Varial says. “If they lose their territory, they lose their culture.”

Alex Shoumatoff

The noted author is at work on his 11th book, a memoir, *From Bedford to Borneo: The Education of an Animist* (Beacon Press). A few years ago, while reporting on orangutan conservation in Borneo, he was so dismayed to see “row after row of oil palms” that he returned to report on the industry’s threat to local people and their environment (p. 78). The island’s rainforest, he says, “is going fast. It’s the greatest destruction of biodiversity on the planet right now.”

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Hana

Discussion

What streaming and the phonograph have in common—great read

@kredcarroll ON TWITTER

FROM THE EDITORS *Among the dozens of readers who responded warmly to “Lone Star,” the photo essay about watermelon farmer Ray Halliburton, was Veronica Ross of Diamond Point, New York: “I was moved and saddened by the fact that our World War II veterans are fading away. My father, Anthony Lewis Szabo, now 97, is one of them.” Teresa Holton Bullock of San Diego also recalled her father’s service: “He too was a small-town-Texas 18-year-old, who found himself sleeping in the snow and eating frozen Brussels sprouts in the Battle of the Bulge.”*

But Peg Gluntz of Loveland, Ohio, whose father is also a veteran in his 90s, offered a dissenting point of view: “The tone of the written words and the photographs are pitying, almost maudlin—the antithesis of what this man and everyone in his generation stood for.” Readers took special note of Jo Marchant’s intrepid feature on cave paintings in Indonesia. “An amazing link to these ancient civilizations. I can’t get enough of articles like this,” Kelly Woodhams said on Facebook.

Jesus’s World

I was pleased to see the article about artifacts from the time of Jesus (“Unearthing the World of Jesus”), but was sorry that your timeline of major events in the life and death of Jesus totally missed the most important one of all: his resurrection from the dead. Without the resurrection, there would not be millions of Christian churches around the world.

Matthew Crews
BARNHART, MISSOURI



The archaeological excavations presently being conducted in the land of Jesus not only are attempting to learn more factual knowledge about Jesus, but also about the origin and growth of Christianity. The more that we learn about the seed from which Christianity sprouted and bloomed, the more we can understand this social phenomenon, which is all the more monumental considering the humble start it received.

Richard Adamski
WATERBURY,
CONNECTICUT

Autism in History

Fascinating article (“Autism in Early America”). It seems clear that the spectrum has been with us throughout history. A person can recognize the symptoms in historical records, older relatives and quirky classmates—all prior to current vaccines.

Paula Thoele
ON FACEBOOK

Park Politics

I was enjoying “Into the Wild” and admiring Robert Redford’s interest and contributions to our national parks, while also recalling some wonderful visits I have made, when I ran smack into this quotation: “The right has such antiquated ideas—if they took charge I think they would want to close the parks, open the land up for development.” Quite likely I am not the only right-wing conservative *Smithsonian* reader who enjoys our national parks and values them!

Cathy Viney
VIA EMAIL

Drop Zone

Although I flew 31 combat missions with the Eighth Air Force during World War II as a bombardier, the one I remember most is the Oranienburg mission of March 15, 1945, described in your story (“Bombs Away”). Early in the morning we were briefed on the new type of bombs we would carry—the AN-M65. As a bombardier, I was individually briefed on the hazards of this unique bomb. Our orders were that if we could not release the bombs on target we were to jettison them over the North Sea on our way back to England. Under no conditions were we to land with the bombs, as they could not be disarmed. Fortunately, all planes were able to drop on target.

Joel Friedman
VENTNOR, NEW JERSEY

Clarification

In our January/February issue, “Reef Madness” mistakenly attributed the cause of coral bleaching to ocean acidification, which is related to rising carbon dioxide levels. In fact, scientists say that coral bleaching is caused primarily by global warming, another consequence of carbon dioxide increase.

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Phenomena

A CURATED LOOK AT SCIENCE, HISTORY & CULTURE

Illustration by
Joe Ciardiello



Fascinating Rhythm

The first song ever published by George Gershwin

was “When You Want ‘Em, You Can’t Get ‘Em, When You’ve Got ‘Em, You Don’t Want ‘Em,” a ditty that one writer later described as “rather Berlinish with a dash of Kern.” Which is not bad for a 17-year-old. The publisher paid Gershwin \$5 for the song (“I never got a cent more,” the composer would recall) in a deal that was struck 100 years ago this month—the unlikely overture to an ecstatically versatile oeuvre that included

solo piano pieces, orchestral works,

AMERICAN ICON

Broadway show tunes, jazz standards, Hollywood film scores and a groundbreaking opera, *Porgy & Bess*, which mixed blues and arias sung by an all-black cast.

Born in New York City to Russian Jewish immigrants, Gershwin was about 10 when he heard Antonin Dvorak’s *Humoresque* shimmer off the violin of a classmate named Maxie Rosenzweig at a grammar school recital—“a flashing revelation of beauty,” he later described it. He started studying piano and, at 15, dropped out of high school to work as a “plugger” at a publishing house in Tin Pan Alley, where he performed

Did ADHD play
a role in George
Gershwin’s
eclectic style?

by Claudia Kalb

the latest sheet music for customers who flocked to hear him play.

Unlike his reserved older brother, Ira—the lyricist, with whom he would frequently collaborate—George couldn't sit still. He brawled, skipped school, stole food from pushcarts. He was so restless that Richard Kogan, a psychiatrist at Weill Cornell Medical College (and a Juilliard-trained pianist) believes that if Gershwin were growing up today, it's easy to imagine him diagnosed with attention deficit hyperactivity disorder, or ADHD. Gershwin himself seemed to see a link between his restlessness and his art. "Studying the piano made a good boy out of a bad one," the composer famously stated. "It took the piano to tone me down."

While other composers drew on European influences and traditional musical structures, Gershwin grabbed hold of diverse traditions to innovate rhythms and melodies that were fresh, culled from the vibrancy of life around him. The rich American melting pot poured from his fingertips. "Old music and new music, forgotten melodies and the craze of the moment, bits of opera, Russian folk songs, Spanish ballads, chansons, ragtime ditties combined in a mighty chorus in my inner ear," Gershwin wrote in 1926. "And through and over it all I heard, faint at first, loud at last, the soul of this great America of ours."

Gershwin's rambunctiousness dissipated as he matured, but not his vitality. As an adult, he tap-danced while waiting for elevators. He composed rapidly, late

into the night. The noises of the city inspired him—the throbbing propulsions of a train in "Rhapsody in Blue," his 1924 composition fusing elements of classical and jazz, the taxi horns in his 1928 symphonic poem "An American in Paris." In his 20s, he hoped to persuade the famed French composer Maurice Ravel to take him on as a student. He was rejected. Fearing that Gershwin might lose his spontaneity, the elder composer is thought to have told him, "Why should you be a second-rate Ravel when you can be a first-rate Gershwin?" Gershwin had plans to compose a symphony, a string quartet, a ballet, another opera. But in 1937, at just 38, he died of a brain tumor.

His life was cut short, but his impact on American music was immeasurable. Leonard Bernstein, who like Gershwin crisscrossed genres and epochs, studied *West Side Story* with echoes of *Porgy & Bess*—both dramatized the depths of romantic love amid racial tensions in uniquely American milieus, and melded operatic style with American vernacular. Carly Simon credited Gershwin's music with encouraging her to continue songwriting after deciding to give it up, and she wrote him a song, "In Honor of You (George)." Billy Joel called him a lifelong "personal inspiration." And the Beach Boys' Brian Wilson, who said he was smitten by "Rhapsody in Blue" at the age of 3 or 4, dedicated an entire album to Gershwin.

"My people are Americans," Gershwin once wrote. "My time is today." And that's still true.



The Art of Seduction

A retrospective of flower portraits casts an edgy iconoclast in a fresh light



To Mapplethorpe, flowers offered a way to broaden his appeal (*Parrot Tulips*, 1988).



ART

Photographer Robert Mapplethorpe may have been best-known for his sexually charged nudes, which opened a new front in the late 20th-century culture wars. But for much of his career (cut short in 1989 by his death, of AIDS, at 42) the New York artist also created pictures of flowers, including 1988's *Parrot Tulips*. The genres are not unrelated, says Britt Salvesen, co-curator of a retrospective opening this month at both the Los Angeles County Museum of Art and the J. Paul

Getty Museum. "He liked to play with eroticization of the flower, its associations with lushness and vitality, but also with the transience of life." The exhibit, the first joint show since the two institutions acquired Mapplethorpe's archive together, in 2011, coincides with a new book, *Mapplethorpe Flora: The Complete Flowers*, which explores work that the artist produced for mass appeal. "Sell the public flowers," he declared. "Things that they can hang on their walls without being uptight." —AMY CRAWFORD

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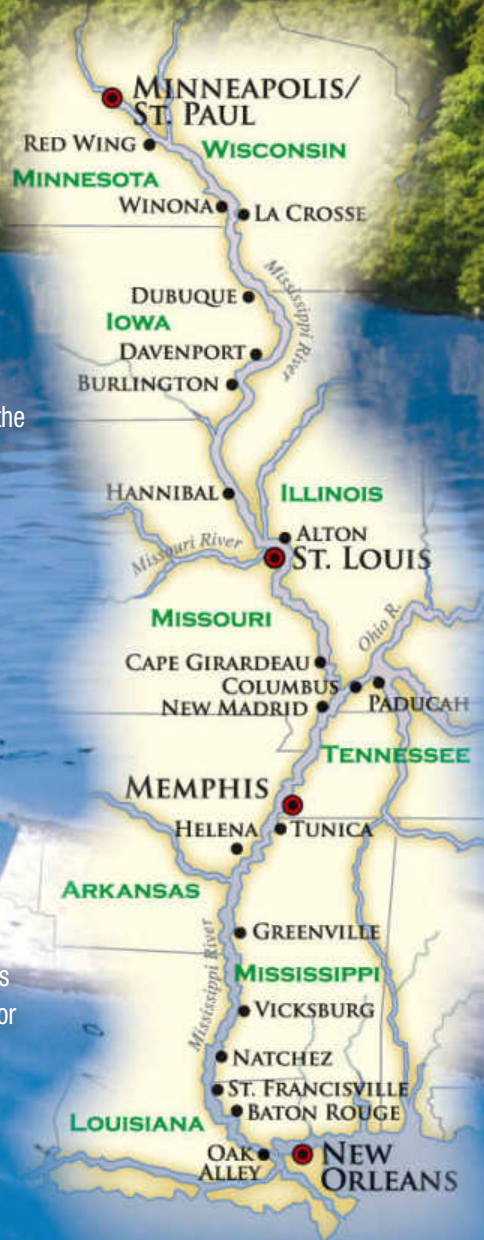
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SMALL TALK

Louisa Thomas

The author of *Louisa: The Extraordinary Life of Mrs. Adams*, on America's sixth first lady

How was Louisa different from her mother-in-law, Abigail, the other "Mrs. Adams"?

Abigail thought Louisa was frail and foreign—"a fine lady," as Louisa put it, which was not something a good New England woman was supposed to be. But Louisa was tougher than Abigail thought, and Abigail was more compassionate than Louisa assumed, and they became closer as the years passed.

You write that Louisa was "not a modern woman, but she had a kind of modern voice." How so?

Her voice was self-aware—irreverent, curious and questioning—in a way that seems urgent and familiar now. She wondered what to live for, and why.

Which three of Louisa's contemporaries would you want to have over for dinner?

Aaron Burr, whom she liked "in spite of myself;" the czar of Russia, who had his eye on her sister, and Thomas Jefferson, whom she loathed.

Which of Louisa's personal effects not in the Smithsonian collection would you want to see displayed?

I would choose an old wash basin her mother gave to her and she gave to her daughter-in-law, Abby. "Could it speak of times past," she wrote to Abby in an accompanying letter, "what mysteries it might disclose; what sorrows and what happiness it might reveal."

Beluga Bubbles

A whale's whimsical pastime offers insight into the mammalian brain

When it comes to quirky animal behaviors, few are more charming than 2,000-pound beluga whales blowing delicate bubbles. But why do they do it? To find out, researchers spent eight years gathering data on 11,858 "bubbling events"—the most comprehensive study of this form of cetacean creativity.

As they observed belugas at Marineland Park near Toronto, the biologist Michael Noonan and his students discovered a kind of bubble semantics. The whales often expelled big bursts of bubbles through their blowholes when they were startled. Pairs released bubble streams as they swam side by side—apparently in a spirit of companionship, unlike the aggression shown by bubbling humpback duos. The belugas also blew bubble rings, but apparently not when they had more serious things to do: Males rarely did it during the spring breeding season. "That's when they're

busy patrolling the pool, cruising for females," Noonan says. In summer, males again blew bubble rings, swatting to change their shapes and swimming through them as if they were hoops. "This is a species that makes its own toys," says Noonan.

Whimsical behavior isn't unique to belugas. Apes, dogs, birds, reptiles and even spiders play, according to a recent issue of the journal *Current Biology* devoted to the subject. But animal play usually takes the form of tugging, chasing or wrestling—activities that might help develop survival skills down the line. In contrast, a mammal has every reason not to exhale underwater. "When you're a breath-holding animal," says Noonan, "you can hardly think of anything more precious than air."

One possible explanation is that the belugas are bored. In the wild, they cover vast distances and dive into deep trenches. At a marine park,

they're confined to concrete pools. "Captive animals are deprived of a lot of normal stimuli," says Gordon Burghardt, a professor at the University of Tennessee and the author of *The Genesis of Animal Play*. "So you often see them engaging with their environments in ways they wouldn't normally do."

But Noonan, an expert on animal cognition at Canisius College in Buffalo, New York, thinks there's more to it than that. He argues the whales might be blowing rings for much the same reason that people dance or draw: to engage with the world and express their innate curiosity about it. "We're mammals and they're mammals," Noonan says. "That doesn't mean their mental lives are identical to ours. But until proven otherwise, I think we can assume we are more similar than we are different."

—JENNIE ROTHENBERG GRITZ

ADAPTATION



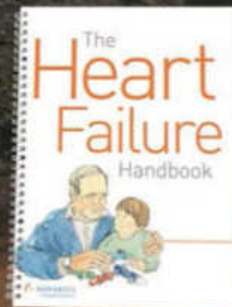
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FAST FORWARD

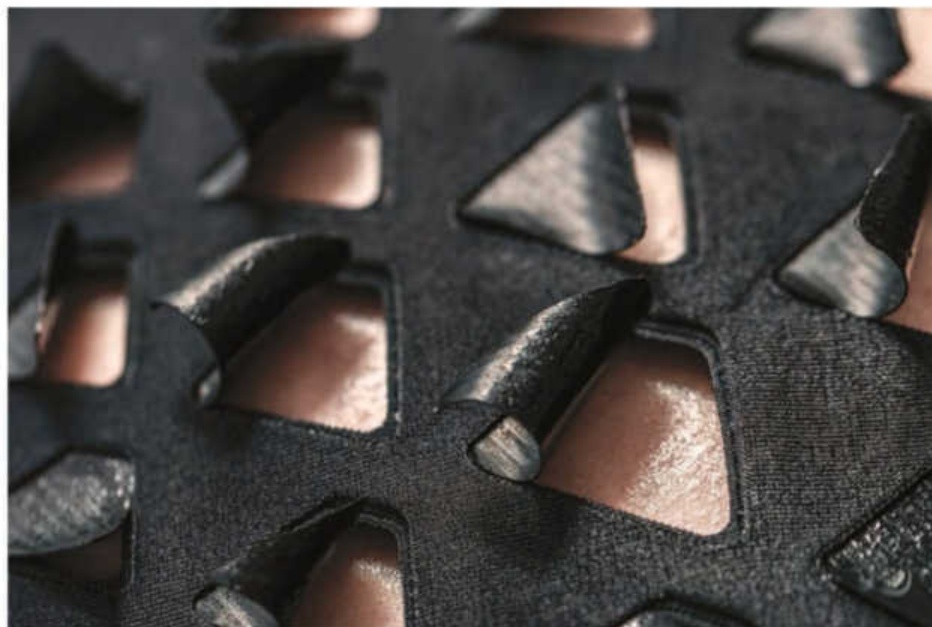
Natto was an obvious choice for Yao's team of chemical engineers, computer scientists and designers, who were looking for a bacteria that would react to moisture but was also safe to work with. "We did research in the Asian supermarket," she jokes. The researchers think that the bacteria's unusual ability to rapidly absorb and shed moisture stems from its porous, lattice-like structure and thin cell walls.

The garment's starting point is a biohybrid film, produced by a printer that lays down lines of natto bacteria onto plastic or latex, which is then cut into flaps and sewn into the specialized cloth. The MIT researchers, whose work was supported by New Balance, collaborated with fashion designers at London's Royal College of Art for the actual garment designs. ("None of us knows how to sew," Yao says.) The team has created full-body prototype garments that bring to mind "Star Trek" uniforms, and is working with New Balance to develop them into something you might be able to wear to the gym in a few years.

The next step is to engineer a version that can withstand washing. Because nobody wants to smell like fermented soybeans.

—BRITT PETERSON

Microbiology meshes with fashion to create a new kind of cool



There's nothing new about clothing derived from biology—think leather, fur, wool, even silk. But a garment that's actually *alive*? Not until now. MIT Media Lab researchers have incorporated living bacteria into a synthetic fabric, creating a material that responds to body moisture and hinting at a future of clothing that reacts to the person wearing it.

The key to the "Second Skin" fabric is the trillion or so single-cell organisms printed into every garment, which has dozens of tiny tri-

angular flaps. The bacteria change shape quickly in response to moisture—"within seconds or even milliseconds," says Lining Yao, a PhD student who leads bioLogic, the biohybrid materials project in the Tangible Media Group. When a person wearing the fabric heats up (and begins to sweat), the bacteria expand and the flaps open, releasing heat from the skin. Once the skin dries, the bacteria contract, closing the flaps and retaining body heat. The result: a fabric with its own miniature HVAC system.

The bacteria in question, *Bacillus subtilis natto*, are well known to foodies and Japanese history buffs. According to one legend, the micro-organisms were discovered a millennium ago by a samurai who, while fighting a battle, left his steamed soybeans in their straw wrapping. When he opened the container days later, he found that the beans had been fermented by the straw, becoming sticky and, to the Japanese palate at least, deliciously pungent. Natto has been a delicacy in Japan ever since.

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The Evil Twin of Dennis the Menace

The lovable American cartoon character has a sinister British counterpart

They were born simultaneously, in March 1951, two entirely independent and wildly contrasting Dennis the Menaces. One was the creation of Hank Ketcham, a former Disney animator in California. The other was the brainchild of the British cartoonist David “Davey” Law. Neither had any knowledge of the other’s Dennis until both debuted in the same week—Ketcham’s in the funny pages of 16 U.S. newspapers and Law’s in the venerable and anarchic British weekly *The Beano*. Each Dennis would carry on for decades, spawning TV shows and theme-park attractions.

Mischief was the common concept: Both Dennises were rowdy boys, running amok, turning the grown-up world on its head. American Dennis was a little tearaway in dungarees, an adorable scamp pestering poor Mr. Wilson next door. He did and said the darnedest things; you couldn’t stay mad at American Dennis. British Dennis was much further along the mischief spectrum—a disturbed maverick of prepubescence, a bully, a nemesis, a persecutor of “softies” (in particular the unfortunately recurring Walter), a mean-minded vandal with whom the authorities were in a permanent and justified rage.

The contrasting antics of British Dennis (top) and American Dennis (bottom).

Physically, the two were day and night: American Dennis was blond and cowlicked, with a round face and the short, ham-like forearms of a “Peanuts” character. British Dennis was knobby-kneed and low-browed, gleefully scowling under an inkblot of high-speed hair. The red and black stripes of his jersey

expressed the buzzing wave band of his criminality. He carried a peashooter, water pistol and catapult, and his exploits generally ended in corporal punishment. British Dennis had a canine accomplice, Gnasher, who would have eaten American Dennis’ sweet dog, Ruff, in two seconds flat, and he later had a



TRIBUTE

disgusting pig, Rasher. If he’d had a dubiously raincoated older-man acquaintance called Flasher it wouldn’t have been much of a surprise.

What accounts for the moral gulf between Dennis and Dennis? Take a look at a 1933 poem called “My Parents Kept Me From Children Who Were Rough.” The poet, Stephen Spender, was upper-class and Oxford-educated, a friend of W.H. Auden’s. He was, essentially, Walter the Softy, and in that poem, he gave eloquent voice to his feelings about the Dennises of his childhood: “I feared more than tigers their muscles like iron/ And their jerking hands and their knees tight on my arms.”

American Dennis radiated the irrepressible energy of a young republic. In contrast, British Dennis represented a form of transgression that didn’t even exist in the United States. He emerged during a time of class struggle and waning empire, when the U.K. establishment feared the oik, the yob, the ungovernable prole. In short, British Dennis was a proto-punk-rock-hooligan. For young British schoolchildren, he was, and still is, an object of riveting terror (and on the shadow side, of yearning): the rough boy with the iron muscles and tiger stripes. —JAMES PARKER

See more of the comics at Smithsonian.com/Dennis



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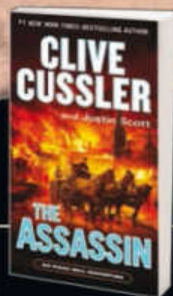
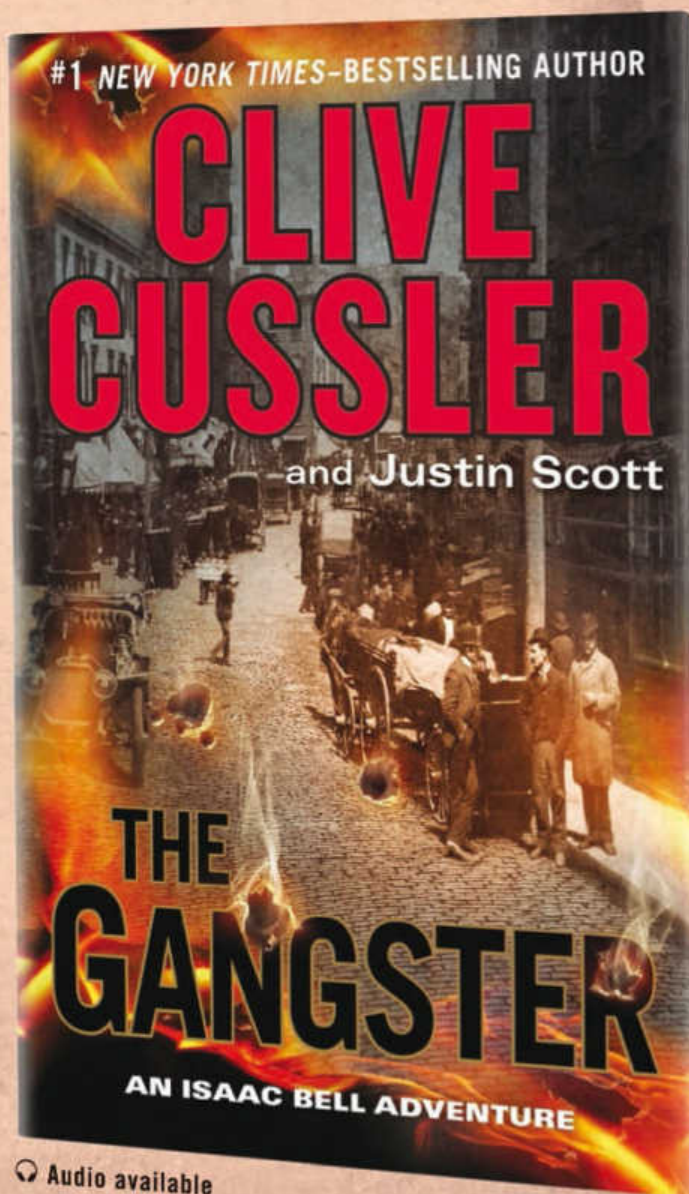
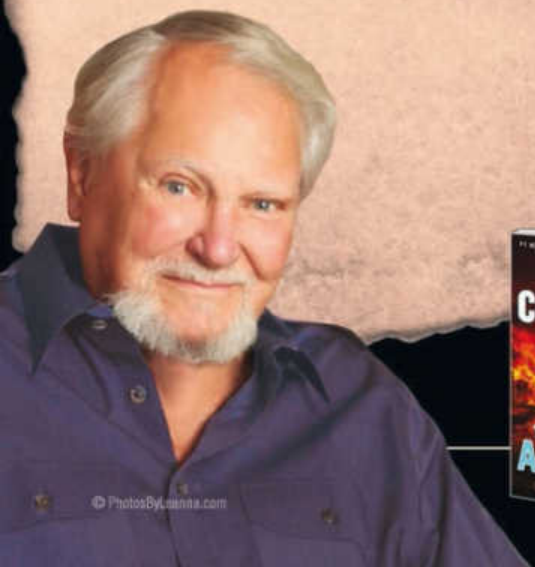
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OMG! We've Been Here B4

Texting isn't the first new technology blamed for ruining personal discourse and common courtesy

BY CLIVE THOMPSON *illustration by Kotryna Zukauskaite*

Is text-messaging driving us apart? These days, we talk to each other a lot with our thumbs—mashing out over six billion text messages a day in the United States, and likely a few billion more on services like WhatsApp and Facebook Messenger.

But some worry that so much messaging leads, paradoxically, to less communication. When Sherry Turkle, the MIT clinical psychologist and author, interviewed college students, they said texting was causing friction in their face-to-face interactions. While hanging out with friends they'd be texting surreptitiously at the same time, pretending to maintain eye contact but mentally somewhere else. The new form of communication was fun, sure, but it was colliding with—and eroding—the old one.

"Our texts are fine," as one student said. "It's what texting does to our conversations when we are together that's the problem."

Plenty of people agree. Jenna Birch, a young journalist, recently argued that texting is inferior to talking face to face because it's too easy to misinterpret—over-overinterpret—tone. Worse, texting makes it more likely for her generation to dodge difficult emotional conversations, the "hard stuff." If we don't shape up, she warned, "we'll all end up on interconnected islands, together in our aloneness."

New technologies often unsettle the way we relate to one another, of course. But social ruptures



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caused by texting have a strong echo in the arguments we had a hundred years ago. That's when a newfangled appliance gave us a strange new way to contact one another en masse: the telephone.

When Alexander Graham Bell introduced his telephone in March 1876, the invention was riddled with problems. The line was a crackly mess—prone to interference from nearby electrical lines—and it was powered by a battery that leaked acid. Still, it allowed for a remarkable, unmooring experience: For the first time, you could talk in real time to someone blocks or miles away. “It was like a voice from another world,” marveled one early user. Bell quickly improved the quality, and customers thronged. In the first year, over 3,000 telephones sold; by 1900 there were over one million phones nationwide.

At first, the telephone was marketed mainly as a tool for business. Physicians and drugstores bought them to process orders, and business owners installed them at home so they could be quickly reached. The phone, proclaimed early ad copy, gave business leaders an ESP-like “sixth sense” of their far-flung operations.

The idea of using such a powerful tool for everyday conversation? That seemed laughable and obnoxious. One early social critic warned that the phone should not be used for the “exchange of twaddle between foolish women.” Businessmen prohibited their wives from tying up the line, lest they interfere with commerce. “At the beginning, women were forbidden to use the phone—the business was supposed to have the priority,” notes Michèle Martin, a professor emeritus at Canada’s Carleton University and author of *Hello, Central?*

But it quickly became apparent that people wanted to talk—to socialize. One phone company manager in 1909 did a survey of usage and found that 30 per-

cent of all calls were “idle gossip,” lasting 7.5 minutes on average each. He didn’t like this chitchat, but he was running against the stream. Eventually phone firms realized there was more money in selling lines for banter than for business. “They realized, ‘We can make money off gossip and idle conversation and sociability on the telephone,’” says Claude Fischer, author of *America Calling: A Social History of the Telephone to 1940*.

Within a few years, phone companies were emphasizing how they could reduce isolation and bring friends together. A California firm in 1911 declared that its phone was “a Blessing to the Farmer’s Wife,” adding that “it relieves the monotony of life. She cannot be lonesome with the Bell Service.”

Indeed, women quickly became the dominant users of the telephone. “In

‘Hello! Hello! Who am I talking to?’” Others argued that the phone might be fine for some things, but not for delicate communications—like inviting an acquaintance to dinner. (“Never excusable, save among very intimate friends,” etiquette author Annie Randall White wrote in 1901.)

Nonetheless, the telephone quickly gave birth to curious new forms of socializing. Callers arranged regular weekly “visiting” calls, dialing remote family to catch up on news. “Distance rolls away and for a few minutes every Thursday night the familiar voices tell the little family gossip that both are so eager to hear,” a Bell ad cooed in 1921.

Phone companies even boasted that the phone was an improvement over that stodgy, low-fi communication, the letter. “Correspondence will help for a time, but friendships do not flourish for long on letters alone,” a 1931 Bell sales manual noted. “When you can’t visit in person, telephone periodically. Telephone calls will keep up the whole intimacy remarkably well.”

How do you start a conversation when you can’t see the person you’re talking to? Thomas Edison advocated beginning each call with “Hello,” but masters of etiquette cringed.

some ways it was liberating,” Martin notes, because it gave housebound wives much more social contact—without the enormous work of maintaining visual appearances in face-to-face interactions.

Still, users struggled to figure out the social protocols of this new ethereal realm. How do you start a conversation when you can’t see the person you’re talking to? Thomas Edison advocated beginning each call with “Hello,” but masters of etiquette cringed. “It sounded too much like a ship-to-ship call across to another,” laughs Fischer—far too crude and abrupt, a barbaric yawp devoid of social grace. As one social critic sneered at the time: “Would you rush into an office or up to the door of a residence and blurt out

Soon, though, social critics began to wonder: Was all this phone chatter good for us? Was it somehow a lesser form of communication than what had come before? “Does the telephone make men more active or more lazy?” wondered the Knights of Columbus in a 1926 meeting. “Does the telephone break up home life and the old practice of visiting friends?”

Others worried that the inverse would occur—that it would be so easy to talk that we’d never leave each other alone. “Thanks to the telephone,





TECHNOLOGY TELEPHONE

motor-car and such-like inventions, our neighbors have it in their power to turn our leisure into a series of interruptions,” complained an American professor in 1929. And surely it couldn’t be healthy to talk to each other so much. Wouldn’t it create Too Much Information?

“We shall soon be nothing but transparent heaps of jelly to each other,” a London writer moaned in 1897. Others fretted that the telephone sped up life, demanding instant reactions. “The use of the telephone gives little room for reflection,” wrote a British newspaper in 1899. “It does not improve the temper, and it engenders a feverishness in the ordinary concerns of life which does not make for domestic happiness and comfort.”

Perhaps the strangest thing was being in the room while a friend talked

hensions of shot guns and bull dogs,” a magazine article in *Electrical World* noted. Scamsters loved the phone.

“It changed people’s ideas of social trust,” notes Carolyn Marvin, a professor at the Annenberg School for Communication and author of *When Old Technologies Were New*. We could no longer read someone based on face-to-face social cues.

Indeed, some believed the phone improved our social behavior, because it forced a listener to pay closer attention to a speaker. Devoid of visual signals, we must be “all ears and memory,” a pundit wrote in 1915: “The mind cannot wander.” Plus, by eradicating distance, wouldn’t the phone reduce misunderstanding? War, even? “Someday we will build up a world telephone system making necessary to all peoples the use of a common language, or common understanding of languages, which will join all the people of the earth into one brotherhood,” gushed John J. Carty, AT&T chief engineer, in 1907.

These utopian views, of course, were

Academics have observed this shift, too. “My students just do not think of the phone as a mechanism of vocal interaction—they think of that as very rare,” says John Durham Peters, a communication professor at the University of Iowa, and author of *Speaking Into the Air*. He doesn’t think the shift to texting has degraded our interactions, though. By the middle of the 20th century, studies found that the telephone appeared not to have eroded social contact—indeed, some research found those with phones wrote more old-fashioned letters than those without. Similarly, modern surveys by the Pew Research Center have found that teenagers who text the most are also those who spend the most time face to face with friends. Communication, it seems, begets more communication, and—as Peters argues—just because talk happens in text doesn’t mean it’s not meaningful.

“Media scholars,” he notes, “have this long romance with ‘conversation’ as the cure to the disease of media.”

Still, it’s not hard to be dispirited by the divided attention so many of Turkle’s subjects bemoaned in their lives. Indeed, Michèle Martin, of Carleton, thinks we’re living through a replay of the telephone, where the things that made it valuable—instant communications—are the same that made it annoying. “People believe they are liberated because they can bring the mobile phone everywhere,” Martin says. “But at the same time they are slaves to it.”

The poet Carl Sandburg captured that dissonance in a 1916 poem about the telephone. He imagined a telephone wire being aware of the disparate uses to which it was being put—coursing with conversations both deep and frivolous. “It is love and war and money; it is the fighting and the tears, the work and want / Death and laughter of men and women passing through me, carrier of your speech.” ○

Modern surveys have found that teenagers who text the most are also those who spend the most time face to face with friends. Communication begets more communication.

to someone else—someone outside the room. In 1880, Mark Twain wrote “A Telephonic Conversation,” transcribing the half-a-conversation as he listened to his wife on the phone. To the observer, as the skit pointed out, a telephone call sounded like disjointed nonsense. Even phone companies worried about whether the device created new forms of rude behavior; a 1910 Bell ad warned about “Dr. Jekyll and Mr. Hyde at the Telephone.”

In essence, the telephone was a transportation device, bringing other people—including, disconcertingly, strangers—suddenly into one’s home. Young ladies, some fretted, were at romantic risk. “The serenading troubadour can now thrum his throbbing guitar before the transmitter undisturbed by appre-

wildly optimistic. But the gloomy views of pessimists, as Fischer notes, didn’t come true either. Even Emily Post, the etiquette expert, came around to the telephone. By the 1920s, she’d accepted “Hello” as a suitable greeting, and even thought it was acceptable to invite someone to dinner with a call. “Custom which has altered many ways and manners has taken away all opprobrium from the message,” she shrugged.

Nowadays, the telephone call seems like a quaint throwback to a gentler era. When Jenna Birch, the journalist, started dating a man who insisted on calling her on the phone, she found it warm and delightful—though her friends thought the behavior odd. Phone calls now seem retro.



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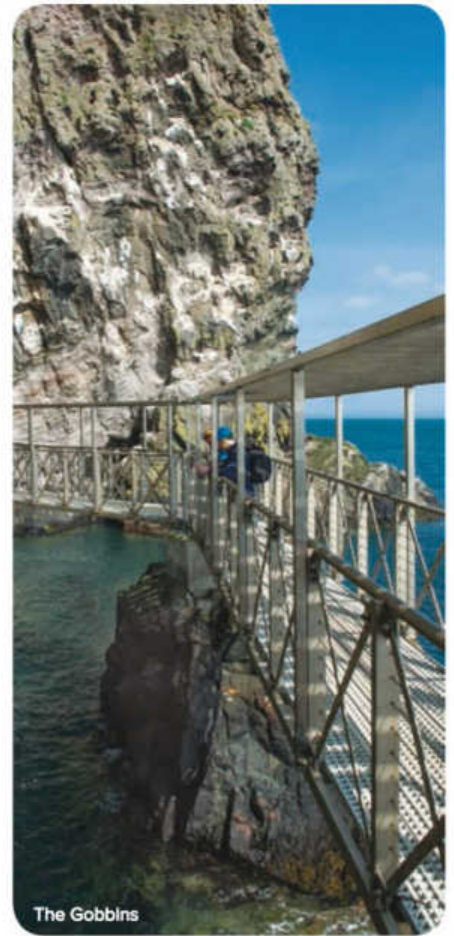
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Northern Ireland, Savor the Place

When Northern Ireland declared 2016 to be a celebration of the country's culinary and cultural riches, it ended up scheduling a full 366 days of foodie experiences and events. That extra day is proof that the cornucopia of everything delicious about this country is truly overflowing. Thanks to its wild coasts, endless green acres and famously changeable weather, Northern Ireland's beef, lamb, game, seafood, dairy, fruit and vegetables are among the best in the world. To best experience the local food culture, see, taste and talk to the artisan producers at one of the many farmers' markets.

A great place to begin your Irish foodie adventure is in **Belfast**, where talented chefs have taken advantage of this abundance to create a local culinary renaissance. Restaurateur Michael Deane is at its forefront, with

seven restaurants that have earned him a Michelin star for 12 consecutive years. **Deanes Meat Locker** is almost a place of pilgrimage for steak lovers; its beef is sourced from over 100 of Northern Ireland's best producers and then aged in a chamber of hand-cut Himalayan rock salt bricks—before being grilled to succulent perfection. The not so carnivorously inclined will want to flock to **OX**, a relative newcomer to Belfast's dining scene acclaimed for its peaceful setting overlooking the River Lagan and its changeable feast of seasonal dishes featuring the freshest produce, paired with a superb list of artisanal wines and spirits. Next, a trip to **Titanic Belfast** will satisfy your appetite for adventure. There you can explore the historic shipyard with its nine interactive galleries, and uncover the mysteries of the RMS *Titanic* in the city where it all began.

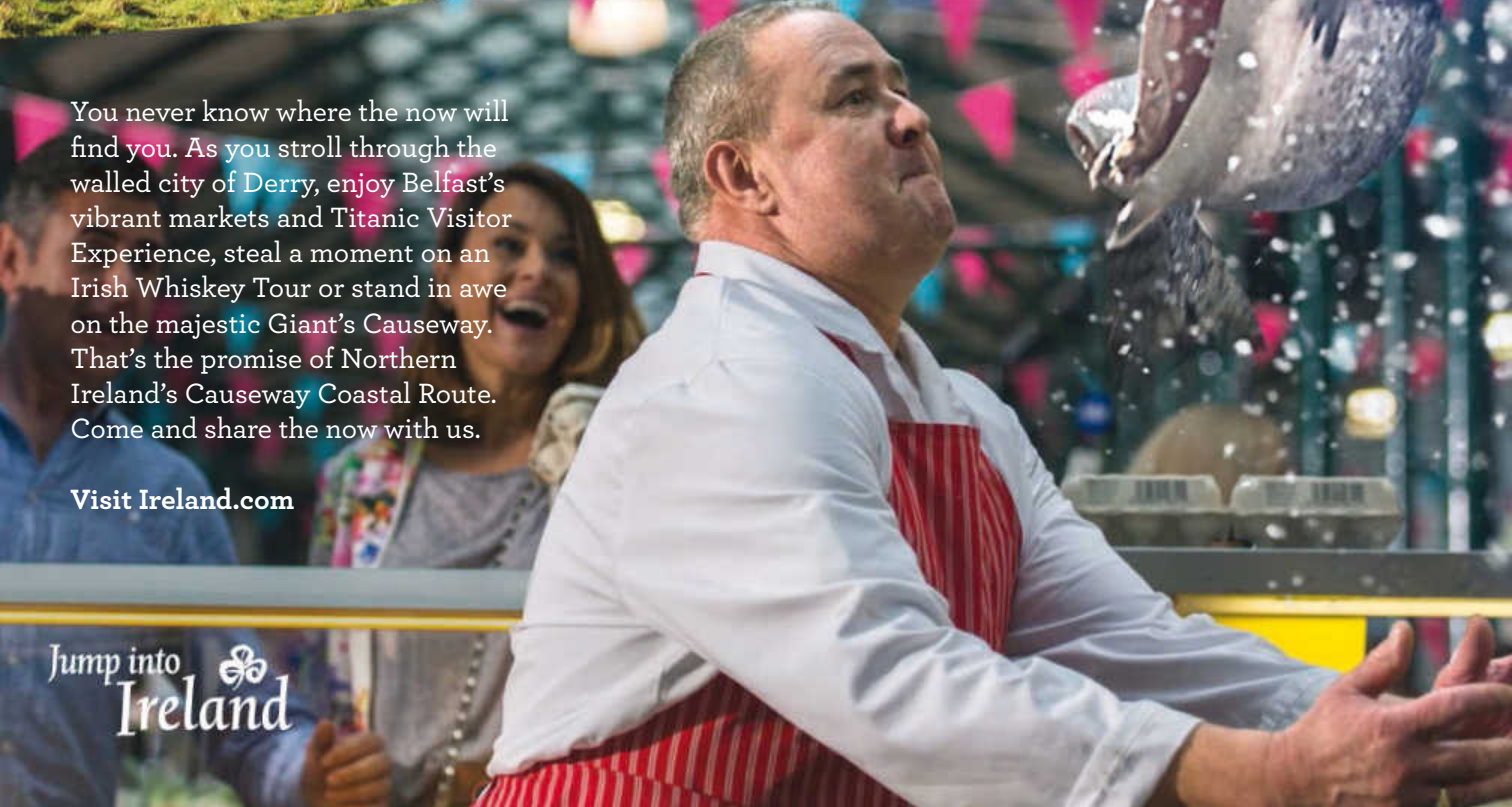
From Belfast take a leisurely drive along the **Causeway Coastal Route**, which hugs a strip

of coastline perched between sea and high cliffs. This spectacular scenery is perhaps best enjoyed with a visit to **The Gobbins**, a marine cliff path famed for its ravines, caves and natural aquariums. Considered an engineering marvel when first opened in 1902, The Gobbins fell into disrepair and closed before being reengineered and reopened in 2015, with 15 new bridges and a tunnel that plunges beneath the waves.

No visit to Northern Ireland would be complete without exploring its heritage and history. The medieval walls of **Derry-Londonderry** enclose an ancient city with a lively heart—its population is one of the youngest in Europe. History, both real and imagined, comes alive here in attractions like the **Tower Museum** with its landmark exhibitions, and **Mussenden**, a tiny temple atop Downhill Beach, which was transformed into "Dragonstone" during the filming of HBO's *Game of Thrones*.



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Missing Saigon

Vietnamese immigrants are spicing up America's fast-food capital with banh mi, curried frogs' legs and pho



sitting one lunchtime in Mr. Pho, a thriving soup bar in the heart of the city's official Asian district, a 20-block enclave with at least 30 Vietnamese restaurants. Across the table were Mai McCoy and Vi Le, who both arrived in the United States as young children shortly after the fall of Saigon.

"My mother makes a new batch of pho every week," Vi says. "It takes forever—you're boiling bones, skimming the fat, boiling some more. But once you've clarified that broth, then you start adding ingredients back in, one at a time, each its own distinct flavor. First the noodles, then the slices of beef, and then—at the table—the basil leaves, the lime, the Sriracha hot sauce. You're layering flavors. It's like with pasta. Do

The Super Cao Nguyen offers fresh fish (above) to landlocked seafood lovers.

**BY SUE HALPERN
AND BILL MCKIBBEN**

photographs by Alyssa Banta

O

Oklahoma City's culinary reputation was cemented in 2007, when *Fortune* magazine declared it the nation's fast-food capital, with the highest number of "heavy users" of the burger and chicken joints year after year.

So perhaps it's not the first place you'd look for some of the nation's finest examples of that ultimate slow food, the Vietnamese soup called pho. Why is it a slow food? Because beef bones simmer for hour upon hour, while the chef's key job is to skim off the fat. All you want is broth. Clean.

In fact, "clean" is the word we heard most often to describe the food we were eating in the savory days we spent in Oklahoma City's thriving Vietnamese community. We were



you want to put parmesan on it? Do you want fresh ground pepper?"

"Every item in there is identifiable," says Mai.

We repeat to the two women what the city's hottest young Vietnamese chef, Vuong Nguyen, had told us the night before. "You have to be able to taste every single ingredient. No muddling things together in a mush."

"Exactly right," says Vi. "As far as my parents are concerned, there's no reason for casseroles to exist."

Elsewhere in our reporting, we've encountered immigrant communities, newly arrived, struggling to make their way in the new world. But the Vietnamese began arriving in Oklahoma 40 years ago, so by now a second and third generation have set down relatively secure and prosperous roots.

But, oh, the beginning was tenuous. Pretty much everyone we talk to begins their story with a boat and a narrow escape.

Mai McCoy, who was 6 when she left Vietnam, was shipwrecked with her family on a Malaysian peninsula, where they were greeted by soldiers with machine guns. "There were more than 200 people on this fishing boat—everyone had paid with gold bars. The people who paid more were up on deck. Down below it was . . . not good. My sister was frail, and my dad was holding her up to the porthole just to get some fresh air somehow. On the Malaysian beach, they had a little rice porridge to eat. My [other] sister remembers it falling in the sand, and she remembers eating it sand and all because she was so hungry. Food is still comfort to her."

Ban Nguyen made it out on a plane, but his father-in-law, Loc Le, whom he describes as the great tycoon of South Vietnam, lost everything when the Communists won, using his last money to buy a boat and cramming others aboard. "They got out as far as a freighter, and the freighter wanted to just give them some water and let them keep going. But my father-in-law clung to the freighter's anchor line. 'Take us aboard or we'll die.'" He ended up run-

ning a tiny breakfast restaurant in Oklahoma City, Jimmy's Egg, which Ban has now grown to a 45-restaurant chain.

In 2008, the owners of the Super Cao Nguyen market, Tri Luong and his wife, Kim Quach, raised funds to bring a replica of one of those overcrowded fishing boats to the small park near their store for a few days. "I could see all the memories coming back to my father's eyes," says Remy Luong, their youngest son.

But by that point the fear was long since gone, and Oklahoma was long since home. Super Cao Nguyen ("my father saw Super Walmart and Super Target, so he added it to the name of the central highlands in Vietnam, which was a touch of home," says Remy's brother Hai) has gone from a store with a few aisles selling dry Asian noodles to a behemoth Asian market, busy all day and absolutely packed on weekends with shoppers from all over the state and beyond, speaking at least 20 different languages. "It's a melting pot,"

sil-seed beverage (a very sweet drink with texture) or brawny-looking buffalo fish. A hand-lettered sign, with more recently added English translations, lets you choose from 12 different ways to get your fish, beginning with "Head On, Gut Out, Fin Off." "We have 55,000 items and between my brothers and my parents we've tried them all," says Remy. "We're all big foodies. We eat, sleep, dream food. When some customer comes to us with an idea for some product we should carry, the first thought that pops into our head is, 'That sounds delicious.'" And most of it does, though sometimes a little gets lost in the English translation: We didn't go out of our way to sample "gluten tube" or "vegetarian spicy tendon."

We joined Remy—named for the premium French cognac—at the nearby

"We eat, sleep, dream food. When some customer comes to us with an idea for some product we should carry, the first thought that pops into our head is, 'That sounds delicious.'"

says Hai. "I've had people come in and they are in tears because they've found a product from back home they've been missing for years." The bakery spins out a thousand baguettes a day—Vietnam, of course, spent much of its recent history as a French colony, so the French influenced its cuisine in overt and subtle ways. Some of those baguettes are made into the store's classic—and filling—banh mi sandwiches. Three dollars will get you the number one, cha lua (pork loaf): ham, headcheese, pâté, butter, pickled carrots, daikon and jalapeño. "In Vietnam the food has to be transportable," Remy says. "That's how the banh mi was born."

In other aisles you can buy duck balut (eggs with a partially developed embryo, making a crunchy treat) or ba-

Lido Restaurant for a lunch of bun bo Hue (a lemongrass-based beef soup), curried frogs' legs and clay pot pork, braised in the Coco Rico coconut soda that his market sells by the case. "When my parents got to [their first neighborhood in Fort Smith, Arkansas], it was mostly crack houses," he says. But their obsessive hard work—his newly arrived father worked the morning shift shucking oysters and the night shift in a chicken factory—let them open the small store there and eventually buy the Oklahoma City supermarket, which Remy and Hai run with their brother, Ba Luong, and their parents, who refuse to retire. "Our mom is still in charge of the produce," Hai told us, adding that some of it, like the bitter melon and the sorrel-like



FLAVORS VIETNAM

perilla, is grown by “little old ladies” from the neighborhood. “Not working is not in our parents’ DNA.”

Lido was the first Vietnamese restaurant with an English menu in the Asian district, but now “you throw a rock and you hit a good pho place,” Remy says. As we talk, more dishes keep arriving: a fried egg roll with ground shrimp and pork, a hot-and-sour catfish soup.

“The traditional way is to pour soup into the rice bowl and eat a little bit of soup first before moving on to the other dishes,” Remy instructs. The catfish is buttery soft and nearly melts in the mouth, with the cool *ngo*—the Vietnamese term for cilantro—providing a counterpunch to its warmth. And then we turn to the frogs’ legs—another nod to the French—which are bathed in curry and buried in vermicelli and, yes, taste like chicken, and the fresh spring rolls, and the fried spring rolls, and the clay pot with its coconut-caramelized pork, and the crisp fried squid and the shrimp with broken rice, which is made from fractured grains. “In Oklahoma you can

never order enough food,” says Remy as we load up our plates. “In Oklahoma there are three things that bring people together: football, food and family.”

Though the Sooners game is on in the Lido and in Super Cao Nguyen and everywhere else we go, the Vietnamese reverse that Oklahoma trinity: “Family is almost like breathing for me,” Vi Le told us. “When my husband, who’s Caucasian, was courting me, I told him he had to pass muster with the whole family, including my brother. He was like, ‘You mean my future depends on what a 13-year-old boy thinks of me?’ And I was like, ‘Yep. I can live without you, but I can’t live without my family.’” He passed the test, in no small part because he had a strong appetite for her mother’s cooking. (The wedding was a ten-course Vietnamese dinner at the National Cowboy & Western Heritage Museum. “It’s all about the food at the wedding,” Mai says. “You have to have duck, because it’s considered the most elegant dish.” “The fried rice isn’t till the end,” adds Vi. “My college friends were like, ‘Why did you wait to serve the fried rice? We love fried rice!’ But for us, it’s ‘Why fill up with rice when you have the duck?’”)

“My husband had to reroof my parents’ house,” adds Mai. “He had to re-

fence the yard, mow the lawn, take my mother to the store. He had to pay his dues.” But those dues were small compared with the investment the parents had made in their children. Her parents worked the evening shift as janitors at a Conoco refinery, home for half an hour at 9 to eat dinner with the kids and check to make sure they’d done their homework. “The only thing they had when they got here was time. And they spent that time at work to get the dollars to make a life for us.”

“For Americans, it’s like figuring out what your dream job is, or some nonsense like that,” says Vi, who is now general counsel for a major hospital system. “But that was not in the equation for my parents. They wanted that for me, but for them, though they’d been successful in Vietnam, they never looked back. Just to have a job was wonderful. Never being dependent on anyone, making your own way. My dad was always like, ‘If you make a dollar, you save 70 cents.’”

“Money was not a taboo topic,” says Mai. “The bills got paid at the kitchen table. When my mother would talk with someone, it was like, ‘How much do you make an hour? What are the benefits? What will you do next?’” “When I was a little girl,” Vi says, “I apparently asked the American woman next door, ‘Why do you stay home? You could be making money.’”

Perhaps because of that poverty and that drive, the Vietnamese have often excelled in their new home. Ban Nguyen, who runs the chain of breakfast eateries, went to Oklahoma State five years after arriving in the United States with “zero English.” His grades, he says, were mediocre, but he learned something more important for an entrepreneur: “I joined a fraternity. I might have been the first Asian guy to ever get in one at OSU. And yeah, they called me Hop Sing [the fic-



Founded in 1979 with just a few aisles, Super Cao Nguyen now sells 55,000 items.

tional Chinese cook in the television show “Bonanza”] and all that. But if you live with 80 guys in a frat house, you learn how to get along with people. I can talk with anyone,” he said, in a soft Oklahoma drawl—and indeed he’d given hugs or high-fives to half the customers eating eggs and pancakes in the store that day. “I think I’m more American than Vietnamese, more Okie from Muskogee than anything else. But in my head I still think in Vietnamese—those are the words. And, of course, there’s the food. My kids don’t like me sometimes because I like to go out for Asian food when they want Cheesecake Factory, or some big national brand.”

Many of the Vietnamese we talked to—second-generation Americans, though most had been born abroad—were worried, at least a little, that their children might lose sight of the sacrifices their parents had made to make their lives here possible. “I have fears for my kids that they won’t understand the struggle—and that they won’t like the food,” says Mai. “But my 6-year-old, he’ll eat the huyet,” a coagulated blood cake. “And my 2-year-old, his face is all the way down in the pho when he eats it.”

“This generation doesn’t want to eat pho so much,” says Vuong Nguyen, the chef whose Asian fusion cooking at Guernsey Park, on the edge of the Asian district, earned a passionate following. “For them it’s like, ‘Have you had that amazing cheese steak? Have you had that pizza from over there? But the good thing is, everyone else is getting into Vietnamese food.’”

He grew up with his grandmother. “Cooking is all she does. She just cooks. She wakes up and starts breaking down fish. You get up and there’s breakfast waiting. And when you’re having breakfast, she’s saying, ‘Hey, what do you want for lunch?’” He took that early training, added a two-and-a-

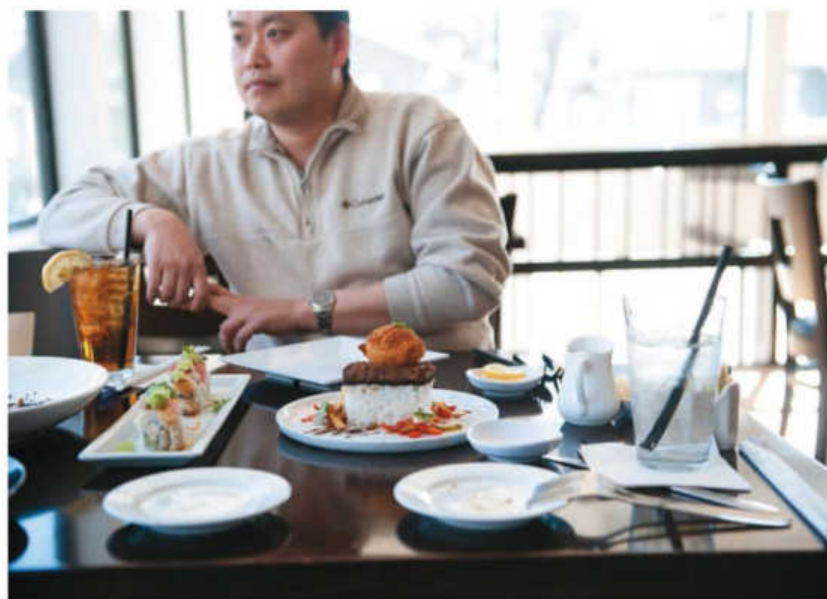
half-year apprenticeship at Oklahoma City’s famed restaurant The Coach House and began producing food that has to be eaten to be believed. “When the owners approached me and said they had a location right on the border of the Asian district and the artsy bohemian district, I said, ‘I have the cuisine you’re looking for.’ It was easy-peasy for me. Most of the stuff on the menu I made up in one try. You could say it’s Asian-inspired home comfort food with French techniques.”

Meaning that he’s using all the tools of the high-powered modern chef (dehydrating kimchi and then grinding the result into a fine powder, say) to recreate the sharp, distinct tastes of classic Vietnamese dishes. At Guernsey Park, his Scotch egg, for instance, resembled the classic Asian steamed

bun, except that the pork sausage is on the outside, a shell of spiced flavor surrounding a perfect soft-boiled egg, with croutons made from steamed-bun dough to soak it all up. Last year Nguyen opened his own well-regarded breakfast and brunch eatery, Bonjour, just north of the Asian district.

Go there sooner rather than later, because chef Nguyen isn’t staying in Oklahoma too much longer. This son of the immigrant experience—where people were so grateful to be in a stable, peaceful nation that they clung like barnacles to the new land—is preparing to head out into the vast world himself. As with many of his generation, the shy and retiring stereotype of his forebears no longer applies. “I want to expand my mind,” he says. “YouTube doesn’t do it for me anymore.” One of the first stops will be Vietnam, where he plans to work a “stage,” or short-term apprenticeship, in some of the country’s great eateries. “But I need to go, and soon. My wings are spread so far I’m hitting people in the face.”

“This generation doesn’t want to eat pho so much,” says chef Vuong Nguyen. “For them it’s like, ‘Have you had that amazing cheese steak? Have you had that pizza from over there?’”



Ba Luong (above, dining at Guernsey Park) runs Super Cao Nguyen with his family.

A human-headed
winged bull from
the eighth century
B.C. Assyrian
royal palace in
Khorsabad. ISIS
razed the city's
ruins last year.





MURDERING HISTORY

An eyewitness report on the devastating cultural genocide being waged by ISIS and combatants in Syria's civil war

by James Harkin

WE TREAD CAREFULLY, AS IF TIPTOEING AROUND the scene of a crime, through a series of beautiful arches into the narrow alleys of the ancient Souk al-Medina, which at some eight miles long is one of the most glorious covered markets in the entire Middle East, selling everything from soap and spices to jewelry, shoes, ceramics and textiles. Merchants from Europe and China and Iran, from Iraq and Egypt, have met here in Aleppo, Syria, to sell their wares since the 13th century. For just as long travelers have immersed themselves in the ornamented Turkish baths, or *hammam*. The last time I ambled around the market, five years ago, I could barely move amid the bustle.

Now it's an empty wasteland, and a war zone. The entrails of old buildings—tangles of concrete and metal corsetry—poke down from ceilings or hang limply out of their sides. Many have been broken by mortars or toasted into blackened husks by the fires that followed. Some of the old stone arches we pass through look about to collapse. Holes have been blown in the wall of an old mosque, and its dome has crumbled like deflated pastry. In over an hour walking the length of the market, the only nonmilitary inhabitants I see are two roosters, stepping in single file and picking carefully through the broken glass. Apart from mortar shells thumping to the ground elsewhere in the Old City and the occasional round of gunfire, there is little sound but the lurch and creak of steel and upended masonry, like sinister wind chimes.

The souk is within the walls of Aleppo's historic city center, one of six locations in Syria listed as World Heritage Sites by Unesco. Before largely peaceful protests in 2011 against the autocratic Syrian president Bashar al-Assad were met with government violence and devolved into a devastating civil war, killing at least a quarter of a million people and displacing millions so far, the country was one of the most beautiful on earth. Much of its enchantment came from its plentiful antiquity, which wasn't fenced off as in European capitals but lay unceremoniously around—part of the living, breathing texture of everyday life. The country, at the crossroads of Europe, Africa and Asia, boasts tens of thousands of sites of archaeological interest, from the ruins of our earliest civilizations to Crusader-era fortifications and wonders of Islamic worship and art.

Now these antiquities are under large-scale and imminent threat. Already some of the most valuable have been destroyed as collateral damage in the shelling and crossfire between government forces and various rebel factions; others have been sold off, bit by valuable bit, to buy guns or, just as likely, food or a way to escape the chaos. Satellite images of treasured historical sites show the soil so completely pocked by holes, the result of thousands of illicit excavations, that it resembles the surface of the moon—destruction and looting, as Unesco director general Irina Bokova put it last fall, on “an industrial scale.”

And then there is the Islamic State, or ISIS, the terrorist group whose conquering of vast swaths of territory first in Syria and then in Iraq has turned the destruction of heritage into a new kind of historical tragedy. As seen in videos gleefully disseminated online by its infamous propaganda wing, ISIS militants have attacked priceless artifacts with jackhammers, rampaged through museum galleries housing historically unique collections, and exploded sites in territory they control for scarifying effect. Last May, hundreds of ISIS fighters overran another Unesco site in Syria, the ancient city of Palmyra, renowned for its Roman-era ruins.

Faced with the monumental scale of the country's archaeological losses, it

Aleppo's souk, including its Turkish baths (right), is now destroyed. “We cannot forgive the loss of culture,” said one resident.

would be easy to succumb to fatalism. That would be wrong. Plenty has been saved, and there is more that can still be done. Behind the scenes, bands of men and women are working hard to move antiquities out of harm's way, support buildings in distress and document the damage in the hope of doing something about it later on. As a British-Irish journalist long fascinated by Syria, I'd been covering the war since its beginning: sometimes with visas from the Syrian regime, other times embedded with anti-government rebel forces in the country's north. Now I was determined to survey firsthand the destruction of cultural property, so I requested permission from the Syrian regime to go to Aleppo

and meet with leading figures in the fight against it; to my surprise, the authorities said yes.

Aleppo is Syria's largest city, and its Old City, for three years a battleground between the Syrian Army and armed rebels, has seen some of the most extensive archaeological destruction. One thousand of the souk's old market stalls and 140 historic buildings in the rest of the Old City have been damaged beyond repair. I am accompanied by a military chaperon, and twice we are forced into a sprint to avoid the attentions of a sniper. The government, which retook the Old City from rebel groups early in 2014, blames rebel militias for the destruction here, but this is disingenuous. Like many of Syria's historic sites, the Old City's narrow crannies and natural fortifications make good cover, and neither side has turned down the opportunity to use the place for military advantage. Sandbags are piled high at the intersections, which are now military outposts. Trapdoors, which perhaps once led to rebel tunnels, are everywhere. So are improvised barriers; at certain points the boulders are piled so high in front of us that we have to turn back.

In the residential quarter almost everything we walk past is beyond repair; whole five-story homes have been gutted by fire, their beams bent double under the stress. An old stone mansion built into the souk has been reduced to thick lumps of masonry, each a few feet long and resembling a giant brick; only the metal door, emblazoned with a nameplate, is still standing. A mosque dating from the Mamluk Sultanate, in the Middle Ages, is blackened, with fresh cracks in its side; in the library, books have been thrown onto the floor; empty shelves suggest that others are missing. Everything left behind is coated in soot.

Photos of his loot showed pots, coins and a stone relief. **“It's very bad,” the smuggler said, “but I have to make a living.”**



Walking under a long vaulted roof snaking through the remains of the souk's thoroughfare, we chance upon a carpeted side room with an imposing rectangular structure in its center. Three or so yards long, and wrapped in blankets, it resembles an animal. The box is a shrine to a famous sheik and historical figure named Ma'rouf Ibn Jamr. Although the surrounding architecture, including a connected mosque, has been severely damaged, the interior of the sheik's shrine had been spared. My interpreter, from Syria's Ministry of Information, a bespectacled, fastidious man whose ringtone is the overture from Mozart's *Marriage of Figaro*, explains the government's decision to keep it here rather than deconstruct it and move it elsewhere for safekeeping. "To remove it would be to ruin it," he says.

He also points out that the interred human remains should not be disturbed. "It's a tomb, so it has its own respect. Keeping it here and protecting the whole area is a better option."

As we move through the wreckage, my guide tries to remain upbeat. "This is the business heart of Syria," he reminds me, and perhaps himself. "They can rebuild it." They will have their work cut out for them. Unesco estimates that 60 percent of the Old City has been destroyed.

We arrive at a vantage point from which we can peer up and see, only yards away, the ancient Citadel, which dominates the skyline. The 150-foot-tall plateau was first settled as early as the third millennium B.C. Ancient cuneiform texts have identified it as the site of a temple dedicated to the storm god Haddad. According to the Koran, Abraham once climbed its hills to rest and milk his sheep. It was also used from the time of the Greeks to the Byzantines. In the 12th century, the son of Saladin—the great Kurdish warrior and founder of the Ayyubid dynasty—dug a moat and expanded the complex by building massive stone walls that have stood to this day. Now under the

control of the Syrian Army, the Citadel is one of the few sites in Aleppo that hasn't taken a hit.

Perhaps 500 yards away is the jewel of the Old City, the Ummayyad Mosque, which was for several years in the hands of Islamist rebels. In April 2013, I was in Aleppo, on the rebel side of the battle lines, watching TV with fighters loosely affiliated with the Free Syrian Army as news arrived that the mosque's beautiful and imposing minaret, built in A.D. 1090, had been destroyed, presumably by government artillery. Puffed up with their own propaganda, the rebels I sat with decried the brutality of the Syrian regime and, as they saw it, its wanton destruction of their religious symbols and places of worship.

But it takes at least two sides to make a war, and now I hoped to see if I could catch

by Islamist rebels. Its arches are still glorious and most of the rectangular building and intricately patterned courtyard are intact, but one of its two domes is punctured, and its thousand-year-old minaret lies collapsed in a heap of bricks.

Inside the National Museum in Damascus, Ma'amoun Abdulkarim, the director of antiquities and museums, is telling me how gloomy his job has become. "When you're adding new collections, it's one of the most beautiful things," says Abdulkarim, who until 2012 had been living a relatively quiet life as a university professor in Damascus. But now grim news reaches him every day: "I'm the first person to receive all the reports about the destruction—it's very bad, psychologically." The National Museum is a grandiose affair dating from the interwar period of the French colonial mandate, and Abdulkarim's large, elegant office is spartan and barely furnished, as if he's had no time to make it his own.

Our paths had crossed before. In March 2014, at Turkey's border with Syria, a local fixer who smuggled journalists into rebel-held northern Syria had tried to involve me in trafficking stolen Syrian antiquities. Photos of his loot showed a clutch of ceramic pots, a slab resembling a limestone relief and coins embossed with the face of Zenobia, Palmyra's third-century Syrian queen, who led a revolt against the Roman Empire. "It is very bad, but I have to make a living," the man said with a shrug. He wondered if I might put him in touch with wealthy American buyers.

Unesco connected me with Abdulkarim, who, in a series of conversations on Skype, blamed the crisis on an "armed archaeological mafia" working with rebel militias and thriving on the chaos of the armed insurgency. His interest in conflict archaeology and conservation, he told me, stemmed from watching the widespread theft of antiquities that followed the American-led invasion of Iraq. Much of

The demolition of Palmyra's Temple of Baalshamin (below) was called a war crime by the U.N. At right, an 1866-67 photo of a Palmyran arch.



a glimpse of the mosque, esteemed as among the most beautiful in the Muslim world, from the regime-held part of the city. After a friendly army officer lets me into his watchtower, I race up eight flights of stairs in the dark, poke my head out of a tiny improvised turret—and there it is, framed in the foreground beneath the Citadel and the rest of the Old City, less than a hundred yards away in territory held



N° 399 - Palmyre. Arc de triomphe vu de face. Syrie.



Tell Ajaja and Tell Brak

Looted: **2014**

Stealing Assyrian statues and other artifacts, ISIS plundered these active archaeological sites at settlement mounds in Syria's far northeastern Hama province, which stretch back to the 3rd millennium B.C.



Dura-Europos

Damaged: **2013-Present**

The "Pompeii of the desert," built in the 4th century B.C., boasted a synagogue with biblical paintings and a church with the earliest known baptistry. ISIS has engaged in widespread looting and vandalism.



Temple of Bel

Destroyed: **2015**

Among Palmyra's most hallowed ruins, this 1st century A.D. shrine to a Semitic sky god had carved stone ceilings and friezes depicting camel caravans and constellations. It was blown up by ISIS.



Lion of Al-lat

Destroyed: **2015**

Dedicated to a pre-Islamic Arabian goddess, the nearly 12-foot-tall statue, weighing 15 tons, was reconstructed after it was discovered in 1977. ISIS militants used sledgehammers to smash it.



Mar Elian Monastery

Destroyed: **2015**

The 1,500-year-old pilgrimage site for Syrian Christians, which bore centuries-old murals featuring biblical figures, was bulldozed by ISIS, who also kidnapped hundreds of civilians from the area.



Omari Mosque

Destroyed: **2013**

Named for the early Islamic caliph (and a contemporary of Muhammad) who built it, the 7th-century mosque became a meeting place for protesters and rebels before it was bombed by the Syrian regime.



Apamea

Looted: **2011-Present**

Founded in 300 B.C. by the first king of the Seleucids, a Hellenistic empire, the city was later expanded by the Romans, who built a theater and a 1.25-mile colonnaded boulevard. Illegal excavations are rampant.

PILLAGED PAST

Never was more history willfully destroyed in one swath of the world than in recent years



RESEARCH BY KATIE NODJIMBADEM · ILLUSTRATED MAPS BY MARTIN SANDERS



8



Khorsabad

Destroyed: **2015**

The ruins of this Assyrian city, built by King Sargon II in 700 B.C. and celebrated for its colossal *lamassu*, were looted and destroyed by ISIS extremists weeks after they razed nearby Nimrud and Hatra.

9

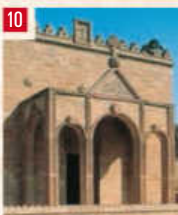


Imam al-Daur Mausoleum

Destroyed: **2014**

An emblematic example of Islamic architecture of its time, the 11th-century "muqarnas"-domed Shia shrine, the first of its kind in Iraq and one of six left in the country, was reduced to rubble by ISIS.

10



Mar Behnam Monastery

Destroyed: **2015**

When ISIS captured this 4th-century Syriac monastery, famed for elaborate medieval-era relief sculptures depicting local legends, the militants expelled the monks and blew it up with explosives.

11



Hatra

Destroyed: **2015**

The city, dating to the Seleucid Empire, which ruled a large part of the ancient world conquered by Alexander the Great, was devastated by ISIS extremists wielding assault rifles and sledgehammers.

12



Nergal Gate at Nineveh

Destroyed: **2015**

This entrance to the oldest Assyrian city was dedicated to a Mesopotamian god and guarded by a pair of *lamassu*, or human-headed winged bulls. ISIS wrecked the statues with automatic drills.

13



Mosque of Prophet Yunus

Destroyed: **2014**

The Sunni house of worship was said to hold the remains of Yunus, the Arabic name for Jonah, a key figure in Islam, Christianity and Judaism. ISIS looted the tomb, then blew up the building with explosives.

14



Monastery of St. Elijah

Destroyed: **2014**

One of Iraq's oldest Christian sites, which had a baptistry, nave and altar in use since the 11th century, was recently confirmed razed by ISIS extremists, whom Unesco described as "terrified by history."



15

Sidi Sha'ab Mosque

Destroyed: **2012**
Extremists used a bulldozer to raze this shrine, which housed the tombs of dozens of Sufi figures.



16

Ahmed Pasha Karamanli Tomb and Mosque

Damaged: **2012**
Salafi militants regarded these Sufi tombs, which date to the 18th century, as heretical.



17

Ahmed Baba Institute

Destroyed: **2013**
Extremists set fire to this Saharan library, which housed more than 20,000 scholarly manuscripts.



18

Mausoleum of Alpha Moya

Destroyed: **2012**
Islamist militants linked to Al Qaeda ravaged this exemplary earthen tomb, one of 16 in Timbuktu.



19

Abu Sir al-Maluq

Looted: **2011**
Seventy percent of the artifacts at this 5,000-year-old burial site for Egypt's elite were stolen after the 2011 revolution.



20

Mallawi Museum

Looted: **2013**
Various thieves stole more than 600 artifacts, including animal mummies, painted coffins and funerary masks.



21

Old City of Sana'a

Damaged: **2015**
This center of Islamic history, with more than 100 pre-11th-century mosques, was reportedly bombed by Saudi Arabia.



22

Sufi Saint Sufyan Bin Abdullah Tomb

Destroyed: **2015**
Al Qaeda-affiliated terrorists bombed this shrine to a scholar and revered member of Saladin's army.

the loot ended up next door in Syria, where, he said, he and his colleagues did their best to find it and send it back.

Wearing a dark suit and tie, and flanked by a translator because of a misplaced nervousness about his command of English, Abdulkarim made engaging company. Our video conversations were punctuated by his giggling at my attempts to speak Arabic and French; his amusement contrasted with his evident horror at what was happening to his country.

Syrian state buildings are usually festooned with official portraits of Bashar al-Assad, but in Abdulkarim's spacious office there is much less political decoration. Many of his former students work in activist organizations that support the Syrian opposition, and they are now trying to protect antiquities in rebel-held areas, often with aid from foreign governments. When I tell him I've spoken to Cheikhmous Ali, a Syrian academic in European exile who leads one such organization, he brightens in recognition and proudly says Ali is one of his former students. "He is now in the opposition," Abdulkarim says. "He's very political, but I understand different voices." (For his part, Ali describes his former professor as a good man working for a bad regime: "He can't say the whole truth. He wants to, but he doesn't have the power to say stop to all this destruction by the Syrian Army.")

But contrasting political allegiances haven't stopped Syria's archaeologists from working together for the greater good. One recent collaboration with opposition-friendly archaeologists in the northern Syrian province of Idlib, Abdulkarim tells me, yielded an agreement by all the armed parties and the local community to put valuable objects, including engraved tablets from the Babylonian era, behind a thick layer of concrete in the provincial museum in Idlib City. "You cannot open it easily," Abdulkarim assures me, of the improvised security arrangement. "You need an electric machine." All the same, he worries that Islamist extremist groups might not respect

the agreement. "No one has taken it until now, because of the local community," he says. "But all the groups know where it is."

Abdulkarim has 2,500 people working under him, not just archaeologists but also engineers and architects—plus guards—including many who continue to work in areas outside the government's control. In August 2012, a week after he became director of antiquities and museums, he says, he began working with international organizations like Unesco to gather the vast bulk of Syria's archaeological treasures from around the country and transport them to the National Museum and other secure facilities. "We try to divide it up, just in case a catastrophe happens," he says. It is dangerous work—ten of his employees have been killed. But since he took the job, Abdulkarim says, 300,000 objects, the overwhelming majority of Syria's museum collections, have been safely hidden.

Now, however, he was reeling from a fresh catastrophe: A video had emerged weeks earlier showing ISIS's religious police, who already had the run of much of northern Syria, taking pneumatic drills, bulldozers and explosives to obliterate a palace and statues at the ancient Assyrian city of Nimrud, in northern Iraq. The ninth century B.C. royal compound was built by King Ashurnasirpal II, who had it adorned with intricately carved stone relief sculptures depicting military conquests, ritual ceremonies and winged creatures; much of the artwork was remarkably well-preserved. In an editorial in ISIS's glossy, English-language magazine *Dabiq*, entitled "Erasing the Legacy of a Ruined Nation," the extremists invoked Koranic scripture and the sin of *shirk*, or idolatry, to label everything pre-Islamic as profane, and it glorified the destruction of "statues, sculptures, and engravings of idols and kings." It also took direct aim at archaeologists and the very idea of a national identity. The *kuffar*—unbelievers—"had unearthed these statues and ruins in recent generations and attempted to

RESCUE MISSION

In northern Iraq, a brave band of conservators trains for a dangerous operation

In the Kurdish city of Erbil, in a class-

room on a nondescript street beneath the historic Citadel, 14 students sit in a semicircle around a teacher who has a mop of graying hair. The teacher is Alaa El-Habashi, a Cairo-based consultant in architecture and cultural

heritage conservation. The students are men and women of all ages, mostly junior- and mid-level employees of the Iraqi Department of Antiquities. The lesson is about how to prevent buildings from falling down, or, short of that, how to ensure that they fall in the right way. "Let's pretend this room has a domed ceiling," says El-Habashi. Everyone in the room looks up. "If you remove the dome, the building collapses."

In the back of the room stands a no-nonsense woman wearing large glasses who helped bring these people together—Corrine Wegener, the Smithsonian Institution's cultural heritage protection officer. She organized this monthlong course in crisis preservation in partnership with the University of Pennsylvania. This week is about stabilizing immovable heritage, such as buildings and museums; last week focused on inventorying and transporting collections in a hurry. "You have to think about worst-case scenarios ahead of time," she says. "That's what we stress over and over." Careful documentation, Wegener tells me, is the golden rule of emergency response; that way when collections have to be evacuated, conservators can keep track of an object's whereabouts. "If they can't find it," she whispers, "I haven't done my job."

Wegener's passion for preserving heritage at risk was sparked by the Ameri-

can-led invasion of Iraq. One morning in 2003, she woke up to news of widespread archaeological looting following the fall of Baghdad to coalition forces. She was then a museum curator in Minneapolis, but she was also an officer in the U.S. Army Reserve's Civil Affairs Division, and she was aghast that plans hadn't been set in place to prevent such losses. She began calling senior Army contacts, and before long she was dispatched to the Iraqi National Museum to help out. "It was a crash course in archaeology and excavation, and how you properly bring things back," she says.

Wegener joined the Smithsonian staff in 2012, after the group she founded in 2006—the U.S. Committee of the Blue Shield—worked with the Institution to protect cultural property in Haiti threatened by the massive earthquake there in 2010. The committee describes itself as a cultural Red Cross, named for the "blue shield" emblem used by the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict to designate sites that are off-limits to combatants—a treaty the U.S. didn't ratify until 2009. After years of navigating academic and political organizations, though, she has a healthy skepticism of bureaucracies. "Let's just see how we can save the stuff," she often finds herself saying.

Wegener shows me pictures from a three-day workshop she conducted in Gaziantep, Turkey, where archaeologists from northern Syria were trained in emergency conservation and provided with items like Tyvek, power tools, bubble wrap and other materials to safeguard antiquities. (Wegener and the Smithsonian work primarily with opposition-friendly archaeologists in rebel-held areas of Syria; to cooperate with the Syrian regime's Department of Antiquities could violate American sanctions against the country.) The projects undertaken after the archaeologists returned home included a covert initiative, in Syria's northern Idlib province, to protect one important museum by sandbagging the structure and encasing its inlaid Byzantine-era mosaics in water-soluble glue and cloth; when the area was later hit by a massive barrel bomb deployed by the Syrian government, the



The statue of Abu Bint Deimun, from third century B.C. Hatra, Iraq. A global network of preservationists are teaming up to protect the world's antiquities.

mosaics remained largely intact.

The institute in Erbil, a spacious two-story building that includes dormitories, classrooms, conservation laboratories and boardrooms, was set up with funding from the U.S. State Department in 2009, in a venture that includes the Kurdish regional government, the Iraqi government in Baghdad and the University of Delaware. Since then, more than 300 Iraqi students have learned to preserve everything from buildings to manuscripts. Under the guidance of Jessica Johnson, the Smithsonian's head of conservation and the Erbil institute's academic director, the ordinary practice of ar-

chaeological conservation is still taught here.

Lately things have become more urgent. In the institute's ramshackle backyard stand mud-brick mock-ups of three traditional structures—a dome, an arch and a vaulted roof. One afternoon I arrive to find students wearing hard hats and busily investigating the innards of each construction. Some snap photos; others are hurriedly drawing sketches to scale. Plastic "artifacts" have been secreted inside each structure. The assignment is to rapidly document a museum building or a heritage site in advance of catastrophic damage. It is a sign of just how grave matters have become in this part of the world that each group has been allotted only 15 minutes.

A couple of days later, El-Habashi hands the heftiest student a sledgehammer and invites him to smash the buildings. After a few carefully judged strikes at each one, they collapse in turn. Bricks roll across the tarmac. Brian Lione, an American and the institute's executive director, who is documenting everything with a video camera, shrugs philosophically. "We'll build another one," he says.

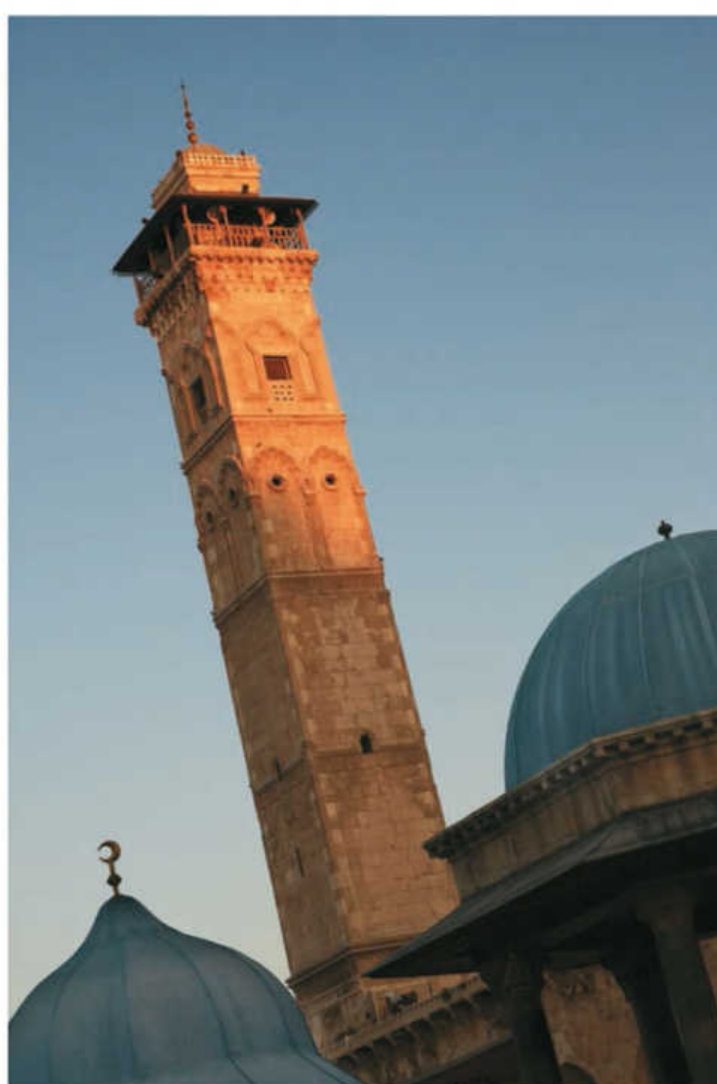
Soon one group is using wooden beams to stabilize the fractured dome, referring to a design sketch they had drawn up before it was "attacked." A second has made a grid out of tape in the rubble, and is painting numbers on loose bricks to indicate their position in the arch. A third group is carefully retrieving the toy artifacts from the collapsed roof of the vault, documenting them and packing them in a crate. It's painstaking work, but, as Wegener explains, there is no substitute for preparation.

Earlier this year, the Smithsonian took over responsibility for running expanded conservation-training courses at the institute, in a contract with the State Department, but it's clear that the critical steps are taken by local curators and residents. "Iraqis and Syrians today are risking their lives by trying to care for cultural heritage," says Wegener. "Many are forced to leave and become refugees, but in the cases where things are saved, it's very often due to the actions of the staff or the community on the ground." —J.H.

portray them as part of a cultural heritage and identity that the Muslims of Iraq should be proud of.” Destroying Nimrud had caused a worldwide outcry, but that was part of the point—it had “served to enrage the kuffar, a deed that in itself is beloved to Allah,” the ISIS propaganda stated.

The group’s annihilative psychopathy seemed to peak in August, when it publicly executed Khaled al-Asaad, Palmyra’s 82-year-old head of antiquities for more than 40 years and a beloved archaeologist. ISIS beheaded al-Asaad and hung his body from a column in the city, condemning him as a “director of idolatry.” But according to some reports, the Islamists killed him because he had refused, during more than a month of captivity and interrogation, to reveal the location of antiquities that his staff had hidden away.

The capture of Palmyra, and the murder of its senior archaeologist, was a blow to Abdulkarim. An ancient trading post and expansive columned city in the central Syrian desert, Palmyra was an established caravan oasis before it came under the control of the Roman Empire in the first century, and its cultural importance as a trade route connecting Rome with Persia, India and China was clear from its unique art and architecture, combining Greek, Roman, Levantine and Persian influences. ISIS militants had pledged not to destroy Palmyra’s famous stone temples, presumably because to do so would fall afoul of their interpretation of Koranic principle, but Abdulkarim wasn’t inclined to believe them. “They are barbarians, extremists,” he said. “We can never trust their words. If the army comes, they will attack it out of vengeance.” The rumor was that ISIS fighters had secreted mines around some of the most famous monuments. From his staff, he heard that they were trying to break into the Palmyra Mu-



seum. “They thought that there was 2,000 kilos of gold hidden inside,” he said. “They are very stupid people.”

Abdulkarim told me that Palmyra’s most important artifacts and statues had been quietly removed to Damascus as ISIS approached. The last rescue operation was completed three hours before Palmyra fell; three of his employees had been wounded in the clashes. A Roman-era specialist himself, Abdulkarim shows me pictures of a hardy, two-millennia-old statue, known as the Lion of Al-lat, which

weighed 15 tons and stood nearly 12 feet high. His staff in Palmyra had buried the great lion in the garden of the city museum, in a metal box fortified with sandbags, but ISIS had located and destroyed it. Now he was afraid for his staff members, too. Some had been able to flee to Homs, a hundred miles to the west, but others had been stranded in Palmyra’s modern city with their families—the area once had some 50,000 residents, and had recently swollen with internal refugees from other parts of the country—

The view I stole from a military turret in the souk, unchanged for thousands of years, was **never going to be the same.**



Aleppo's Umayyad Mosque was famed for its 11th-century minaret (left), which now rests in a heap of bricks (above).

and weren't allowed to leave. Like the ancient city itself, they were being held hostage by ISIS, and might well be disposed of at any time for maximum propaganda effect, or for seemingly no reason at all.

Abdulkarim invites me down several flights of stairs to see some of his staff at work. Behind blast-proof doors in the basement of the National Museum, rows of vinyl-gloved young men and women are hunched over tables, wearing masks covering their mouths. Some are holding tiny clay tablets covered in cuneiform, the ancient writing script developed by the Sumerians, among the region's many transformative contributions to history and

culture; these are part of a batch quietly transported from Mari, a Bronze Age city in eastern Syria now in territory controlled by the Islamic State. A worker examines each tablet and assigns a serial number, which is typed into a computer; then the item is photographed and delicately clothed in wrapping paper before being packed away until such a time that the country might be safe again for antiquities.

The tables are piled high with hundreds of these tiny, carefully labeled boxes. "Illegal excavation has destroyed the site," whispers an assistant. When I take out my camera, a man in a checked shirt I had assumed was a guard quickly turns his back and stands

firmly against the wall, his arms folded. "Please, please," says the assistant, gesturing with his palms that I should put my camera away. It turns out that the man is the one going back and forth between here and Mari to retrieve the priceless tablets. If he were identified and caught by the Islamic State, it would mean certain death.

Sites and items of archaeological interest have always been collateral damage in times of conflict. No one could deny, for instance, the vast stores of cultural inheritance lost during World War II. But targeted destruction of millennia-old antiquities in the birthplace of human civilization, home to ancient centers of power where writing, farming and the

DIGITAL RELICS

In response to the destruction of antiquities by extremists, scholars create virtual archives of what's lost

After terrorists released a video last winter showing themselves smashing artifacts at Iraq's Mosul Museum, Matthew Vincent and Chance Coughenour decided to do what

they could. So the two archaeology graduate students launched Project Mosul, a website that solicits photographs of antiquities and uses 3-D modeling software to create a virtual record of what was lost in the attack.

They're among a growing number of digitally savvy academics, artists and preservationists worldwide who are turning to computer imaging in response to the terrorists' campaign to obliterate history. One Iranian-born artist, Morehshin Allahyari, who now lives in San Francisco, has 3-D-printed miniature, translucent versions of destroyed artworks from the ancient cities of Nineveh and Hatra, and has embedded a flash drive containing images, video and text about the work in each replica. Her work was most recently displayed at the Anya and Andrew Shiva Gallery in Manhattan, in an exhibition called "The Missing: Rebuilding the Past," featuring eight artists' responses to acts of historical destruction. Next month, the Institute for Digital Archaeology, a project from Harvard, Oxford and the Museum of the Future in Dubai, plans to fabricate full-scale copies of the arch at Palmyra's Temple of Bel and place the 3-D-printed structures in Trafalgar Square and Times Square during UNESCO's Heritage Week.

Project Mosul harnesses the power of the crowd. So far, some 2,600 images have been uploaded to the web-



A 3-D rendering from Project Mosul of a *lamassu* at Nimrud.

site, and volunteers have logged more than 100,000 work sessions matching photographs to lost objects and running them through modeling software to create digital reconstructions. Thirty-six of them have now been completed, and the group hopes to release a mobile app within months that will take users to the Mosul Museum in 3-D, using inexpensive virtual reality goggles that work with a smartphone. (The project has also expanded to include antiquities destroyed at other places, such as the ancient cities of Hatra and Nimrud.) "If the object is in fact destroyed, this is not a replacement," says Coughenour, a doctoral student at the University of Stuttgart (his collaborator, Vincent, studies at the University of Murcia in Spain). "The original is still the original, and that can't be debated. We're not trying to reproduce the museum. We're trying to give it a fresh start."

Another online community is #NEW-PALMYRA, whose founder, a Syrian software developer named Bassel Khartabil, began photographing the ruins of the city in 2005 to capture its topography for computer renderings that portrayed it as it might have looked millennia ago. The group became an e-hub for the exploration of ancient Palmyran culture, with original writings, art shows, music and live workshops. An outspoken advocate for the free flow of information, Khartabil was arrested by the Syrian regime in 2012, and his current whereabouts are unknown. In his absence, #NEW-PALMYRA has continued to build and refine its computer images and has begun to release 3-D printing specifications for models of wrecked monuments. This project, says the group's interim director, Barry Threw, is "about getting people involved to contribute things creatively. And I think it's more about the involvement and the actual creative act itself than it is necessarily about what the end products are."

Others are aiming to get out in front of the wanton destruction. CyArk, a nonprofit group based in California well-known for its 3-D modeling of expansive historical sites around the world, launched Project Anqa, named for the Arabic word for Phoenix. For the first phase of the project, done with the International Council on Monuments and Sites, 3-D laser scanners will be given to professionals near a dozen undisclosed sites in Iraq and Syria that are at high risk of being demolished. The resulting detailed maps and "models" of the sites will do more than enable viewers to view significant monuments; they will help specialists prepare the sites in case of attack and may also help officials identify artifacts subsequently looted and sold in the illegal art market.

Beyond that, says CyArk's Elizabeth Lee, the data-rich images might guide experts in future restoration efforts.

—KATIE NODJIMBADEM

world's first cities took shape, suggests that we are witnessing a threat to humankind's shared heritage of a type never before seen.

When I asked Glenn Schwartz, an archaeologist and the director of Near Eastern studies at Johns Hopkins University, if he could think of any precursors to the Islamic State's deliberate annihilation of archaeological treasure under its control, he mulled the question for a moment and mentioned the religious icons and images banned and destroyed by the Byzantine Iconoclasts in the eighth and ninth centuries. But even those acts of vandalism usually involved artifacts that were, he says, "relatively contemporaneous to the acts of destruction." In contrast, ISIS is "targeting buildings which have been standing for 2,000 years or more." Palmyra in Syria, Nimrud in Iraq: These ancient cities were critical to human history and are irreplaceable.

Even the widespread looting that accompanied Syria's slide into chaos is a relatively recent phenomenon—a byproduct, according to Schwartz, of westernized interest and globalized markets. "Five hundred years ago, people wouldn't have bothered looking for artifacts," says Schwartz. "There was simply no market for them. It's because we in the West value these things in a way that no one did before 1800." Schwartz believes that ISIS understands this, and that its televised campaign of archaeological wreckage is intended to undermine the modern states of Syria and Iraq, which prided themselves on their stewardship, and to scandalize everyone who values these antiquities highly. And now that archaeological destruction has become an established weapon in the Islamic State's armament, says Graham Philip, an expert in Middle Eastern archaeology at Durham University in Britain, other groups in the region or farther afield may adopt it.

In the meantime, the destruction in Syria continues unabated. In July of last year, part of Aleppo's Citadel fortress collapsed. Rebels had dug a tunnel

underneath it and, to get them out, the Syrian Army blew the tunnel up, damaging the Citadel wall. In November, another explosion led to further damage near a famed iron gate adorned with dozens of horseshoe designs—the Mamluk Army of the 13th to 16th centuries fought on horseback using bows and arrows—that guards the arched



bridge entrance to the Citadel. The view I stole from a tiny military turret in the souk, unchanged for thousands of years, was never going to be the same again.

Then, in August, days after the murder of Khaled al-Asaad, an Islamic State video showed ISIS militants rolling barrels of explosives into the first-century Temple of Baalshamin, dedicated to the Phoenician sky god, one of the best-preserved structures in Palmyra; shortly afterward, there was an explosion, and once the dust settled it was evident that the place had been razed. Satellite imagery confirmed the temple's destruction—a "new war crime and an immense loss for the Syrian people and for humanity," Unesco's Bokova said.

But most Syrians today are concerned primarily with matters of life and death, and at one point I asked Abdulkarim why anyone should worry about antiquities when people were being killed on an unimaginable scale. "I

understand the humanitarian problem in Syria," he told me. "But we are from the people—we are living this life in Syria." The country's geography means that it has been touched by a cascade of different empires and civilizations, from the Sumerians, Assyrians, Akkadians and Babylonians to the Hittites, Greeks, Persians, Romans, Mongols

In addition to its zealous destruction, ISIS traffics widely in stolen antiquities. Above: Palmyran statues are seized in Lebanon.

and Arabs. Syrians on many sides of the conflict feel the threat to this shared inheritance intensely.

Abdulkarim, a man of mixed ethnic heritage—his mother is Kurdish and his father is Armenian—sees the destruction of Syria's archaeological heritage as a blow to the modern nation's hybrid identity, forged among numerous ethnic and religious groups. Syria's incomparable ancient physical history has long been touted by the regime, which made a priority of protecting it, just as its security state brutally maintained the country's fragile sectarian mosaic. Now the breakup of the country has never seemed so terrifyingly real. "Syria for me is like a wounded man," Abdulkarim went on. "My job is to preserve his head. If one day this wounded man recovers his health, he can see what he is. But if we lose the Syrian heritage, we lose the Syrian common memory. And then we lose the Syrian identity."



BY
Matthew
Shaer



High in the mountains of Kyrgyzstan, scientists and hunters are unlikely allies in an effort to protect the endangered snow leopard before it vanishes

INTO THIN AIR



To reach the Tien Shan

mountains from the Kyrgyz capital of Bishkek, you head east until you hit the shores of a vast freshwater lake called Issyk Kul, and then you turn southeast, in the direction of the Chinese border—a drive of about ten hours, if the weather is good and the roads are clear. The week I made the trip, last winter, in the company of a snow leopard scientist named Tanya Rosen, it took considerably longer. There was rain in Bishkek, and snow on the plains. Every 20 miles or so, we slowed to allow young shepherd boys, stooped like old shepherd men, to drive their

sheep from one side of the ice-slick road to the other. In the distance, the mountains loomed.

“Kyrgyz traffic jam,” the driver, Zairbek Kubanychbekov, a Kyrgyz staffer with Panthera, the American nonprofit where Rosen is a senior scientist, called out from behind the wheel. Rosen laughed. “You’ll get used to it,” she told me. “I remember one of the very first things I decided when I came to Central Asia was that I wouldn’t allow myself to get annoyed or angry at the pace of travel here. Because if you do, you won’t have any time for anything else. I surrendered.”

Rosen, who is 42, was born in Italy and raised in what was then Yugoslavia. She speaks six languages fluently, another two passably, and her accent, while vaguely European, can be hard to place. In another life, she worked as a corporate lawyer in Manhattan, but in 2005, frustrated with her job, she and her husband separated and she moved to Grand Teton National Park and then to Yellowstone, to work for the U.S. Geological Survey with grizzly bears while earning a master’s degree in social ecology from Yale. An interest in big-clawed bears gave way to an interest in big-clawed cats, and for the past half decade, Rosen has spent almost all her time studying *Panthera uncia*, or the snow

leopard, an animal whose life in the wild, owing to its far-flung habitat and fundamentally elusive nature, remains little known.

In Tajikistan, Rosen and her colleagues at Panthera helped to set up a network of pioneering community-run conservancies—areas controlled and policed not by government rangers but by local people. The programs were a success—recent surveys showed snow leopard counts inside the Tajik conservancies climbing up. Now she was pushing north, into neighboring Kyrgyzstan, where, except in a single nature reserve called Sarychat-Ertash, little research has been done. So much remains unknown that scientists debate even the size of the snow leopard population itself: Some thought there were a thousand cats in the country, others put the number at 300.

As we hurtled toward the Tien Shan, Rosen ran down the list of what she hoped to accomplish: persuade Kyrgyz hunters and farmers to set up new conservancies; install camera traps to get a rough measure of the snow leopard population in key areas, which could be used as a base line to monitor fluctuations in the years to come; and, if she got lucky, maybe even manage to get a radio collar on an adult snow leopard, allowing her team to track its movements, map its range and learn more about how it interacts with prey and its environment.

Our first destination was a hunting



The Tien Shan mountains (right) reach 24,000 feet, not far shy of Everest. When doing fieldwork there, Rosen (top) brings Naryn, her taigan hound (middle), and traverses difficult terrain on a mountain horse.

camp high in the Tien Shan, where the owner, a man named Azamat, had reported seeing snow leopards in the surrounding peaks. Azamat had invited Rosen to stay a few days and set up a handful of camera traps. We’d pick up Azamat in his village at the foot of the mountains and continue for another hundred miles up to the camp.

We drove for nine hours straight, past mosques with minarets of sapphire blue, tombs of twisted tin and the occasional dolorous camel. The road narrowed to dirt and reverted back to concrete; we descended only to climb again. I sat in the back seat, next to Naryn, Rosen’s year-old taigan, a Kyrgyz cousin of the Afghan hound. Taigans can be trained to kill wolves, but Naryn, with her gentle, citrine eyes, seemed to have acquired her master’s reserved temperament: She spent her time curled up atop the gear—the better to keep an eye on the rest of us.

Near the shores of Lake Issyk Kul, we stopped to spend the night, and the next day we added another passenger to the already-overstuffed car: Azamat, the owner of the hunting camp. Azamat was dark-haired and absurdly handsome, with little English and a passion for Soviet weaponry; the lock screen on his cellphone, which he showed me immediately after we met, was a glossy photograph of his favorite scoped automatic rifle.

At 12,200 feet, the sage of the plains gave way to the middle reaches of the



mountains, and the only other vehicles were trucks from a nearby gold mine. All around us was an ocean of unbroken snowpack; without sunglasses, it hurt to even open your eyes. At 15,000 feet, according to the altimeter on my satellite phone, the air began to feel painfully thin; my vision clouded at the corners with a gray haze, and my head throbbed.

Before I came to Kyrgyzstan, Rodney Jackson, the head of an American nonprofit called the Snow Leopard

the effects of altitude, and slumped lower into the bench seat.

Rosen shouted: Ahead, a pack of long-horned argali sheep, a favorite prey of the snow leopard, were watching us approach. But before I could get my binoculars focused, they scattered, flecking the slopes with hoof prints. Four days after leaving home, I'd arrived at last in snow leopard country.

The snow leopard is a deceptively small beast: Males are 95 pounds, give

tains of 10,000 feet or higher, in the distant reaches of terrain historically inhospitable to man. It is no accident that in so many cultures, from Buddhist Tibet to the tribal regions of Tajikistan, the snow leopard is viewed as sacred: We must climb upward, in the direction of the heavens, to find it.

And even then, we may not sense its presence. Save for the pink nose and glimmering green or blue eyes, its camouflage is perfect, the black-speckled gray pelt a good blend for both snow and alpine rock. In Kyrgyzstan, I heard stories of experienced hunters coming within yards of a snow leopard without being the wiser for it; the next morning, following the path back to their cabin, the hunters would see tracks shadowing their own.

Although packs of wolves or even a golden eagle may bring down an unprotected cub, the same spring-loaded haunches that allow an adult snow leopard to jump distances of close to 30 feet, from mountain ledge to mountain ledge, make the animal a devastating killer.

Data from the Snow Leopard Trust suggest that the cat will bring down an animal every eight to ten days—ibex or bharal or long-horned argali sheep, whichever large ungulates are nearby—and can spend three or four days picking apart the carcass. Tom McCarthy, executive director of Snow Leopard Programs at Panthera, says he has collared more than a few of the animals in Mongolia with split lips and torn ears: an indication that some of the snow leopard's prey will fight back. But it's also possible that male snow leopards "smack each other around," McCarthy says, in tussles over mountain turf.

Female snow leopards will breed or attempt to breed once every two years, and their home ranges may partially overlap. Pregnancy lasts about 100 days; litters can range from one cub to five, although mortality rates for snow leopard cubs are unknown—the harsh climate, it's thought, may claim a significant number. Once her cubs are born, a female snow leopard will guard them for a year and a half to two years,

Charting the Snow Leopard's Territory



Conservancy, told me that the reason so few scientists chose to specialize in the feline—as opposed to, say, the tiger—is that tracking snow leopards is an intensely physical endeavor: Altitude hurts, and so does the punishing amount of travel involved. Not everyone wants to spend weeks at a time in the mountains, fending off the nausea and the pain of mountain sickness. I was starting to see what he meant. I swallowed a Diamox pill, a prescription medicine to minimize

or take, and light through the back and torso. They stand little more than 24 inches tall. (Female snow leopards are smaller still.) And yet as the late naturalist Peter Matthiessen, who wrote his most famous book about the snow leopard, once noted, there are few animals that can match its “terrible beauty,” which he described as “the very stuff of human longing.”

Although snow leopards will descend to altitudes of 2,500 feet, they are most comfortable in steep and rocky moun-

until the young leopards are capable of hunting on their own.

The life of a male snow leopard is lonelier. He might stay with a female for a few days while they mate, but after that he'll typically return to hunting and defending his territory in solitude. In Kyrgyzstan, he is often referred to, with reverence, as "the mountain ghost."

And yet the snow leopard's remote habitat is no longer enough to protect it. At one time, thousands of snow leopards populated the peaks of Central Asia, the Himalayan hinterlands of India, Nepal, Mongolia and Russia, and the plateaus of China. Today, the World Wildlife Fund estimates that there are fewer than 6,600 snow leopards in the wild. In some countries, according to the WWF, the numbers have dwindled to the point that a zero count has become a real possibility: between 200 to 420 in Pakistan and 70 to 90 in Russia.

The primary culprit is man. Driven by the collapse of local economies in the wake of the Soviet Union's dissolution, and enticed by the robust market for snow leopard parts in Asia, where pelts are worth a small fortune and bones and organs are used in traditional medicines, over the past few decades poachers have made increasingly regular forays into the mountains of Central Asia, often emerging with dozens of dead leopards. Cubs are illegally sold to circuses or zoos; WWF China reports that private collectors have paid \$20,000 for a healthy specimen. The poachers use untraceable steel traps and rifles; like the leopards themselves, they operate as phantoms.

As the human population expands, the snow leopard's range has shrunk in proportion—villages and farms crop up on land that once belonged exclusively to wild animals. In Central Asia, a farmer who opens his corral one morning to find a heap of half-eaten sheep carcasses has plenty of incentive to make sure the same snow leopard doesn't strike again. Meanwhile, snow leopard habitat is being chipped away by mining and logging, and in the future, McCarthy

believes, climate change could emerge as a serious threat. "You might end up with a scenario where as more snow melts, the leopards are driven into these small population islands," he says.

McCarthy points out that the loss of the snow leopard would mean more than the loss of a beautiful creature, or the erasure, as in the case with the Caspian tiger, which vanished in the mid-20th century, of a link to our ecological past. Nature is interlocked and interdependent—one living part relies on the next. Without snow leopards, too many ungulates would mean that mountain meadows and foliage would be chomped



Camera traps (top) have become important devices for gathering data about elusive creatures like snow leopards, who are also tracked by their prints (middle). Scientists can then collect scat for lab analysis (bottom).



down to dirt. The animal's extinction would forever alter the ecosystem.

In recent years, much of the work of organizations such as the WWF, Panthera and the Snow Leopard Trust has centered more on people than the cats themselves: lobbying local governments to crack down on poaching; finding ways to enhance law enforcement efforts; and working with local farmers to improve the quality and safety of their corrals, because higher fences means fewer snow leopard attacks on livestock and so fewer retaliatory shootings.

"There's a temptation to think in terms of grand, sweeping solutions," Rosen told me. "But, as with all conservation, it is less about the animal than it is getting the best out of the human beings who live alongside it."

Jackson says that the primary challenge is one of political will. "I'm convinced that in places where anti-poaching laws are strict, like Nepal, things have gotten markedly better," he told me. "People have seen the cultural incentive in having the cat alive. And they've watched people get prosecuted for poaching, and they're wary of messing with that." But activists and scientists like Jackson have been working in places like Nepal for decades.

By comparison, Kyrgyzstan is a new frontier.

Azamat's hunting camp turned out to be a cluster of trailers sheltered to the east by a stone cliff and to the west by a row of rounded hills. There was a stable for the horses used by visiting hunters, a gas-powered generator for power and wood stoves for heat. Ulan, a ranger acquaintance of Azamat's, had arrived earlier in the day with his wife, who would do the cooking.

We ate a wordless meal of bread and soup and threw our sleeping bags on the bunks in the middle trailer. The stove was already lit. I was sore from the drive, jet-lagged, dehydrated from the elevation. Underneath my thermal shirt, my lungs were doing double-duty. I flicked on my headlamp and tried to read, but my attention span had disappeared with the oxygen. Finally, I

got dressed and stepped outside.

The night was immense; the constellations looked not distant and unreachable, as they had back on earth, but within arm's length. By my reckoning, it was 300 miles to the nearest middle-sized town, 120 miles to the nearest medical clinic and 30 miles to the nearest house.

At 5:30 a.m., Askar Davletbakov, a middle-aged Kyrgyz scientist who had accompanied us to the camp, shook me by the shoulders. His small frame was hidden under four layers of synthetic fleece and down. "Time to go," he said. He had a camera trap in his hand. Rosen had brought along ten of the devices, which are motion-activated: A snow leopard passes by the lens, and snap, a handful of still images are recorded onto a memory card. Later, the camera is collected, and the data is uploaded to a Panthera computer.

We'd hoped to set out on horseback, but the ice in the canyons was too thin—the horses might go crashing through to the river below—so instead we drove out to the canyon mouth and hiked the rest of the way on foot. It was minus 5 degrees Fahrenheit, and colder with the wind. Through the ice on the river I could see sharp black fish darting in the current. Naryn howled; the sound filled the canyon. Resting totemically in the snow up ahead was the skull of an argali sheep torn into pieces by a pack of wolves. The job had not been finished: Clumps of flesh still clung to the spinal column, and one buttery eye remained in its socket.

Nearby, we found the first snow leopard tracks, discernible by the pads and the long tubular line that the tail makes in the snow. A snow leopard's tail can measure three and a half feet; the cats often wrap themselves in it in the winter, or use it as a balancing tool when traversing icy slopes. I knelt down and traced my finger over the tracks. "Very good sign," Rosen said. "Looks fresh. Maybe a few hours old."

Zairbek removed a camera trap from his pack and climbed up a gully

to set it. The process was onerous: You need dexterity to flip the requisite switches, but even a few moments without gloves was enough to turn your fingers blue. Three hours after we'd left camp, we'd traveled two miles and set only four traps.

The canyon narrowed to the point where we were forced to walk single file; the ice groaned ominously underfoot. I watched Ulan, a cigarette in hand, testing the ground with his boot. The accident, when it happened, gave me no time to react: Ulan was there, and then he was not. Azamat pushed past me, got his hands under Ulan's armpits, and hauled him out of the river. The hunter was soaked through to his upper chest; already, his face was noticeably paler. We set the remaining traps as quickly as we could, in caves and in cascades of scree, and turned back home, where Ulan, with a mug of hot tea in hand, could warm his legs in front of the stove.

We ate more soup and more bread, and drank large glasses of Coca-Cola. While in the mountains, Rosen consumes the stuff by the gallon—something about the caffeine and sugar and carbonation, she believes, helps to ward off altitude sickness. I wondered aloud, given the difficulty of just the past couple of days, whether she ever felt overwhelmed. Surely it would be more comfortable to continue to study the grizzly, which at least has the sense to live closer to sea level.

Rosen considered this for a moment, and then she told me a story about a trip to Central Asia a few years back. "I was tired, I was sore," she said. "We'd been driving all day. And then, from the window, I saw a snow leopard a few hundred yards away, looking back at me. Just the way it moved—the grace, the beauty. I remember being so happy in that moment. I thought, 'OK, this is why I'm here. And this is why I'm staying.'"

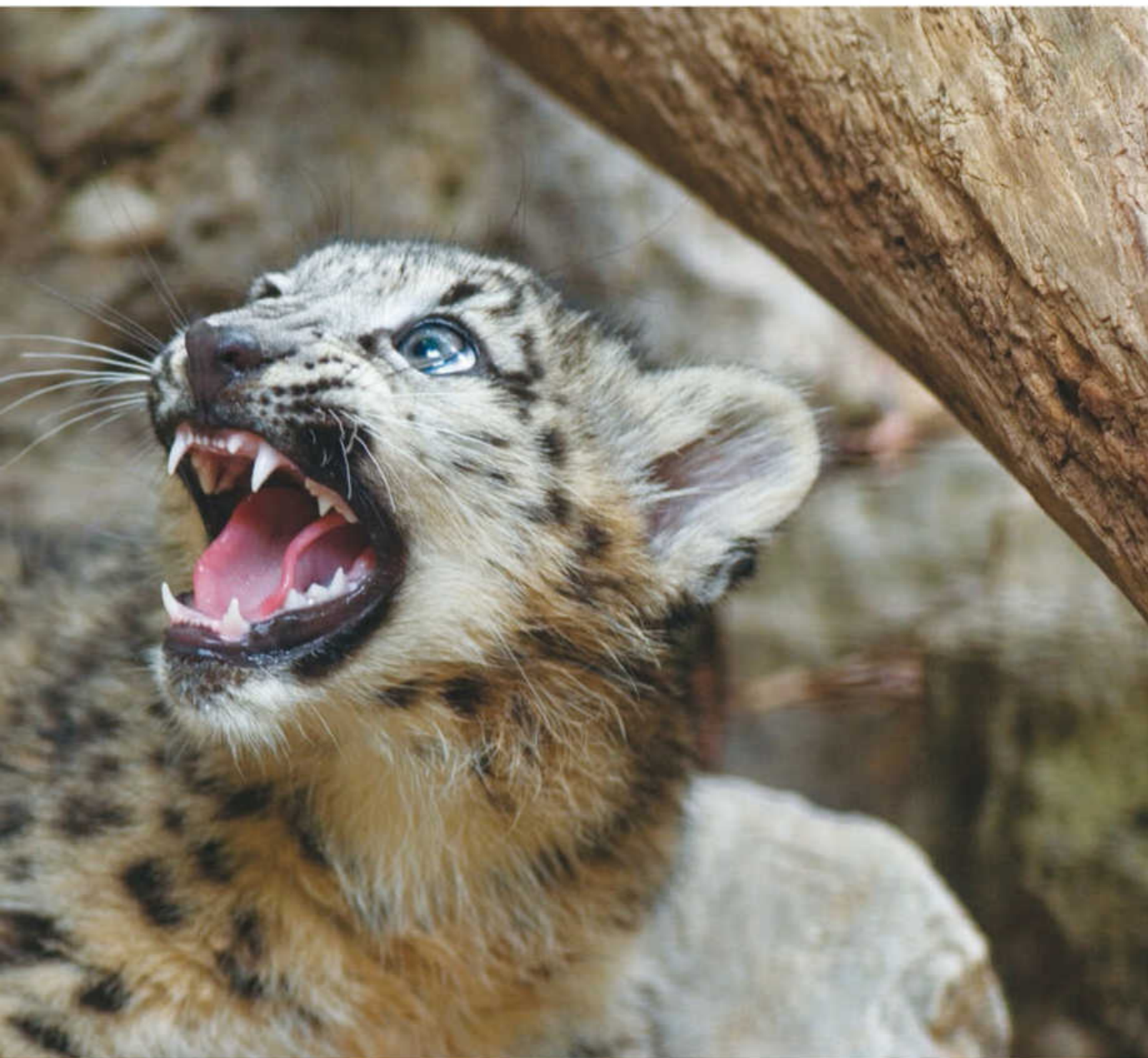
One afternoon, Rosen took me to visit a man named Yakut, who lived in a small village in the Alai Valley, close to the border of Tajikistan. Yakut is slight and balding, with a wispy gray goatee. As a young man in the 1970s, he'd traveled to Russia

to serve in the Soviet Army; afterward he had wanted to stay in Moscow and enroll in a university there—there were plenty of opportunities for an ex-military man. But his father forbade it—Yakut was the only boy in the family—and he returned to the village, married and took over the family farm. In the summers, he hunted. He'd killed a lot of animals: ibex, wolves, bears, argali sheep.

In the summer of 2014, Rosen approached Yakut and other hunters in the village to make an offer: Allow Panthera to assist in establishing a lo-



See snow leopards in their mountain habitat at Smithsonian.com/leopards



cal-run conservancy in the Alai. Unlike the National Park Service in the United States, or the *zapovednik* system in Russia—top-down institutions, where the government designates the protected land and hires rangers to police it—the community-based conservancy model is premised on the belief that locals can often be better stewards of their land than the federal government, especially in fractious areas like Central Asia.

Rosen, with the assurance of local law enforcement and border guards, promised the villagers of the Alai

An increasing number of scientists are recognizing the value in nontraditional approaches to conservation. “In reality,” says Rosen, “the way to protect the snow leopard is with incremental steps.”

that in addition to helping set up the conservancy, they would assist in negotiations with the government for a hunting parcel, where they could charge visitors a fee to hunt animals like sheep and markhor, a large mountain goat. At the same time, the locals would monitor wildlife populations

and carry out anti-poaching work.

Wealthy Kyrgyz city-dwellers and foreign tourists will pay tens of thousands of dollars to bring down an argali sheep. A month earlier, the villagers had registered the conservancy and elected Yakut as its head. Yakut received us at the door to his hut in a watch cap and olive military fatigues—a habit left over from his army days. His home, in the manner of many Kyrgyz dwellings, was divided into three chambers: a hallway for boots and gear; a kitchen; and a shared room **CONTINUED ON PAGE 98**

National Treasure

Power On

When Steve Wozniak booted up the Apple I, he launched a tech revolution

At 10 p.m. on June 29, 1975, Steve Wozniak was ready to test his odd new computer. It didn't look like much—just a circuit board with 32 chips attached, connected to a video monitor and a keyboard.

But when he turned it on? Magic. A cursor appeared on the screen—and better yet, it reacted instantly to whatever keys Wozniak pressed. “I typed a few keys on the keyboard and I was shocked!” he recalled in his memoir, *iWoz*. It was, he observed, the first time in history anyone had typed on a personal computer and seen the results “show up on their own computer’s screen right in front of them.” The sensation of success—he was looking at random numbers he had programmed—was “like getting a putt from 40 feet away.”

The Apple I was born—and with it, the age of the desktop computer.

Only 200 of these computers were made, of which only 66 are known to survive, owned by avid collectors who

pay hundreds of thousands of dollars for each machine. A few months ago, several donors enabled the Smithsonian National Museum of American History to acquire an Apple I, formerly owned by Del Yocam, Apple’s first chief operating officer. Remarkably, the machine arrived still capable of running elementary programs. When it was turned on, marvels Peggy Kidwell, the museum’s curator of mathematics, “the screen was flickering!”

That screen—and its speedy response to typing—may seem mundane, but it’s why the Apple I holds a special place in high-tech history. It pioneered nearly every part of how we interact with computers today.

Before the Apple I came along, computers were almost universally bulky and expensive. A “minicomputer” of the 1960s was the size of a refrigerator and cost tens of thousands of dollars, so only companies and universities typically owned them. They were slow, too: Usually you fed in a program on punch cards or through a keyboard, and the computer typed the output on paper.

Both the size and price began to shrink in the mid-’70s when “microprocessors” emerged, chips that cost less than \$100 yet could run simple software like Basic. Hobbyists began tinkering

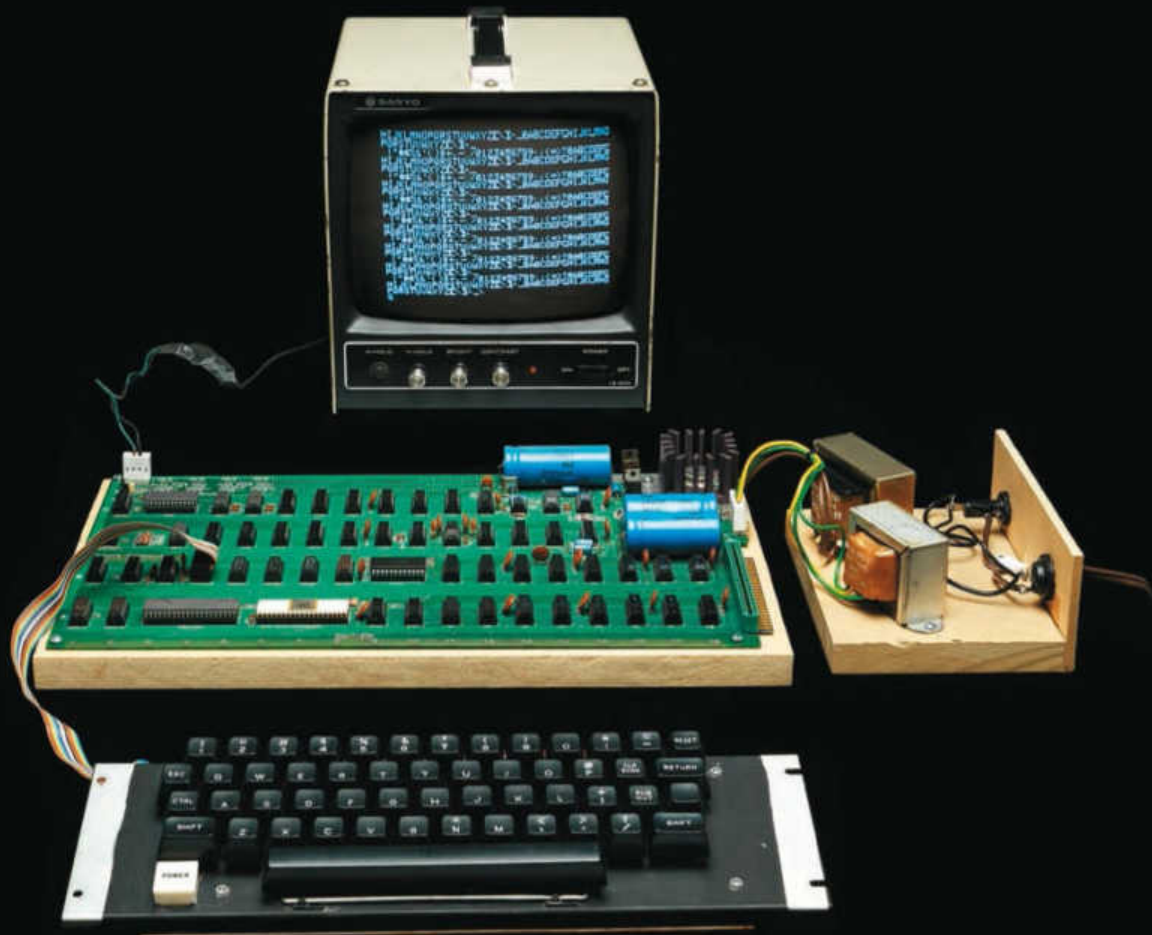
with them, and in 1975, a company in New Mexico released the Altair, a computer you could build from a kit for only \$439. Though small enough to sit on your desk, it was, by modern standards, nearly unusable: You programmed the Altair by flicking switches on the front, and you read the output by interpreting a sequence of LED lights. If you wanted it to print out the answer? A Teletype machine cost a cool \$1,500 or more.

Wozniak, who had long experience working with video displays, cleverly designed the Apple so it could plug into any home TV. It could use nearly any computer keyboard. It was thus “plug and play”—behaving, more or less, like any desktop Dell you’d buy today. Indeed, as Wozniak brought his creation to life, his mind blossomed with all the things one could do with it. Every prediction was bang-on: Play games! Type on a word processor! Use design tools! Or, as his visionary friend Steve Jobs—who encouraged him to co-found Apple Computer, 40 years ago, on April 1, 1976—put it, their personal computer would be “a bicycle for the mind.”

The Apple I sold for only \$666.66. (Wozniak picked the price because he liked repeating numbers; he had no clue about the satanic resonance.) Chris Espinosa was a local teenager who was amazed by the machine, and started showing up at the Byte Shop—a computer store in Mountain View that had ordered 50 Apple I’s—to write

by Clive Thompson

PHOTOGRAPH BY Jaclyn Nash



FROM THE
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Basic programs on the machine. One day, Steve Jobs walked in, saw Espinosa's coding, and hired him to kick the tires on the new version of Basic that Wozniak was creating.

"He needed someone to test it, so he picked this 14-year-old off the street," Espinosa recalls. "That was typical Jobs." Espinosa showed up for work at Apple's headquarters—back then, Jobs' garage—and still works as a lead engineer for Apple today.

The Apple I didn't look like a computer as we know it: It was just a greenish circuit board, waiting for you

to attach the peripherals. (It didn't even have a case.) Last year a woman dropped off an Apple I at CleanBayArea, an e-waste recycling facility in Milpitas, apparently regarding it as a piece of junk. The employee who received it, Victor Gichun, was also unimpressed: "I didn't see anything valuable," he says. It took weeks before another worker realized what they had in their warehouse. ("You idiot!" he hollered at Gichun.) The woman left no contact information, so CleanBayArea sold the computer for \$200,000 and is holding half of that for the donor in case she returns.

The Smithsonian will display only the Apple I circuit board. One challenge, says Espinosa, is that it's hard to replace parts if they wear out, particularly rare ones like the capacitors for the power supply. "It's like trying to find parts for a Model T," he says.

But Apple I holds pride of place as the machine that booted up our modern age. Wozniak knew that even back in 1975. "People who saw my computer could take one look at it and see the future," he later wrote, "and it was a one-way door. Once you went through it, you could never go back." ○





THE RAGING REBELLION



OF JONES COUNTY

In 1863, when a Mississippi farmer named **Newton Knight** declared war on the Confederacy, some called him a hero—while others saw him as a murderous outlaw. Now a new movie about him is reviving the controversy

BY RICHARD GRANT

PHOTOGRAPHS BY WILLIAM WIDMER

On his property, Jones County's J. R. Gavin points out a site that was a hide-out for Newt Knight. "The Confederates kept sending in troops to wipe out old Newt and his boys," says Gavin, "but they'd just melt into the swamps."

W

ith two rat terriers trotting at his heels,

and a long wooden staff in his hand, J.R. Gavin leads me through the woods to one of the old swamp hide-outs. A tall white man with a deep Southern drawl, Gavin has a stern presence, gracious manners and intense brooding eyes. At first I mistook him for a preacher, but he's a retired electronic engineer who writes self-published novels about the rapture and apocalypse. One of them is titled *Sal Batree*, after the place he wants to show me.

I'm here in Jones County, Mississippi, to breathe in the historical vapors left by Newton Knight, a poor white farmer who led an extraordinary rebellion during the Civil War. With a company of like-minded white men in southeast Mississippi, he did what many Southerners now regard as unthinkable. He waged guerrilla war against the Confederacy and declared loyalty to the Union.

In the spring of 1864, the Knight Company overthrew the Confederate authorities in Jones County and raised the United States flag over the county courthouse in Ellisville. The county was known as the Free State of Jones, and some say it actually seceded from the Confederacy. This little-known, counterintuitive episode in American history has now been brought to the screen in *Free State of Jones*, directed by Gary Ross (*Seabiscuit*, *The Hunger Games*) and starring

a grimy, scruffed-up Matthew McConaughey as Newton Knight.

Knight and his men, says Gavin, hooking away an enormous spider web with his staff and warning me to be careful of snakes, "had a number of different hide-outs. The old folks call this one Sal Batree. Sal was the name of Newt's shotgun, and originally it was Sal's Battery, but it got corrupted over the years."

We reach a small promontory surrounded on three sides by a swampy, beaver-dammed lake, and concealed by 12-foot-high cattails and reeds. "I can't be certain, but a 90-year-old man named Odell Holyfield told me this was the place," says Gavin. "He said they had a gate in the reeds that a man on horseback could ride through. He



said they had a password, and if you got it wrong, they'd kill you. I don't know how much of that is true, but one of these days I'll come here with a metal detector and see what I can find."

We make our way around the lake-

shore, passing beaver-gnawed tree stumps and snaky-looking thickets. Reaching higher ground, Gavin points across the swamp to various local landmarks. Then he plants his staff on the ground and turns to face me directly.

"Now I'm going to say something that might offend you," he begins, and proceeds to do just that, by referring in racist terms to "Newt's descendants" in nearby Soso, saying some of them are so light-skinned "you look at them and you just don't know."

I stand there writing it down and thinking about William Faulkner, whose novels are strewn with characters who look white but are deemed black by Mississippi's fanatical obsession with the one-drop rule. And

not for the first time in Jones County, where arguments still rage about a man born 179 years ago, I recall Faulkner's famous axiom about history: "The past is never dead. It's not even past."

After the Civil War, Knight took up with his grandfather's former slave Rachel; they had five children together. Knight also fathered nine children with his white wife, Serena, and the two families lived in different houses on the same 160-acre farm. After he and Serena separated—they never divorced—Newt Knight caused a scandal that still reverberates by entering a common-law marriage with Rachel and proudly claiming their mixed-race children.

The Knight Negroes, as these children were known, were shunned by whites and blacks alike. Unable to find marriage partners in the community, they started marrying their white half-siblings instead, with Newt's encouragement. (Newt's son Mat, for instance, married one of Rachel's daughters by another man, and Newt's daughter Molly married one of Rachel's sons by another man.) An interracial community began to form near the small town of Soso, and continued to marry within itself.

"They keep to themselves over there," says Gavin, striding back toward his house, where supplies of canned food and muscadine wine are stored up for the onset of Armageddon. "A lot of people find it easier to forgive Newt for fighting Confederates than mixing blood."

I came to Jones County having read some good books about its history, and knowing very little about its present-day reality. It was re-



Newton Knight (above) was legendary as a crack shot and formidable tactician. "He was a beacon of a man, ahead of his time," says Matthew McConaughey (below), who portrays Knight in the film.



puted to be fiercely racist and conservative, even by Mississippi standards, and it had been a hotbed for the Ku Klux Klan. But Mississippi is nothing if not layered and contradictory, and this small, rural county has also produced some wonderful creative and artistic talents, including Parker Posey, the indie-film queen, the novelist Jonathan Odell, the pop singer and gay astronaut Lance Bass, and Mark Landis, the schizophrenic art forger and prankster, who donated fraudulent masterpieces to major American art museums for nearly 30 years before he was caught.

Driving toward the Jones County line, I passed a sign to Hot Coffee—a town, not a beverage—and drove on through rolling cattle pastures and short, new-growth pine trees. There were isolated farmhouses and prim little country churches, and occasional dilapidated trailers with dismembered automobiles in the front yard. In Newt Knight's day, all this was a primeval forest of enormous longleaf pines so thick around the base that three or four men could circle their arms around them. This part of Mississippi was dubbed the Piney Woods, known for its poverty and lack of prospects. The big trees were an ordeal to clear, the sandy soil was ill-suited for growing cotton, and the bottomlands were choked with swamps and thickets.

There was some very modest cotton production in the area, and a small slaveholding elite that included Newt Knight's grandfather, but Jones County had fewer slaves than any other county in Mississippi, only 12 percent of its population. This, more than anything,

explains its widespread disloyalty to the Confederacy, but there was also a surly, clannish independent spirit, and in Newt Knight, an extraordinarily steadfast and skillful leader.

On the county line, I was half-expecting a sign reading “Welcome to the Free State of Jones” or “Home of Newton Knight,” but the Confederacy is now revered by some whites in the area, and the chamber of commerce had opted for a less controversial slogan: “Now This Is Living!” Most of Jones County is rural, low- or modest-income; roughly 70 percent of the population is white. I drove past many small chicken farms, a large modern factory making transformers and computers, and innumerable Baptist churches. Laurel, the biggest town, stands apart. Known as the City Beautiful, it was created by Midwestern timber barons who razed the longleaf pine forests and built themselves elegant homes on oak-lined streets and the gorgeous world-class Lauren Rogers Museum of Art.

The old county seat, and ground zero for the Free State of Jones, is Ellisville, now a pleasant, leafy town of 4,500 people. Downtown has some old brick buildings with wrought-iron balconies. The grand old columned courthouse has a Confederate monument next to it, and no mention of the anti-Confederate rebellion that took place here. Modern Ellisville is dominated by the sprawling campus of Jones County Junior College, where a semiretired history professor named Wyatt Moulds was waiting for me in the entrance hall. A direct descendant of Newt Knight’s grandfather, he was heavily involved in researching the film and ensuring its historical accuracy.

A large, friendly, charismatic man with unruly side-parted hair, he was wearing alligator-skin cowboy boots and a fishing shirt. “I’m one of the few liberals you’re going to meet here, but I’m a Piney Woods liberal,” he said. “I voted for Obama, I hunt and I love

guns. It’s part of the culture here. Even the liberals carry handguns.”

He described Jones County as the most conservative place in Mississippi, but he noted that race relations were improving and that you could see it clearly in the changing attitudes toward Newt Knight. “It’s generational,” he said. “A lot of older people see Newt as a traitor and a reprobate, and they don’t understand why anyone would want to make a movie about him. If you point out that Newt distributed food to starving people, and was known as the Robin Hood of the Piney Woods, they’ll tell you he married a black, like that trumps everything.



For Wyatt Moulds (above) the film is “an idea whose time has come.” Opposite, in Ellisville: a fading mural depicts town history (top); the house where a Confederate general was shot, likely by Knight (bottom).

And they won’t use the word ‘black.’”

His current crop of students, on the other hand, are “fired up” about Newt and the movie. “Blacks and whites date each other in high school now, and they don’t think it’s a big deal,” said Moulds. “That’s a huge change. Some of the young guys are really identifying with Newt now, as a symbol of Jones County pride. It doesn’t hurt that he was such a badass.”

Knight was 6-foot-4 with black curly hair and a full beard—“big heavyset man, quick as a cat,” as one of his friends described him. He was a nightmarish opponent in a backwoods wrestling match, and one of the great unsung guerrilla fighters in American history. So many men tried so hard to kill him that perhaps his most remarkable achievement was to reach old age.

“He was a Primitive Baptist who didn’t drink, didn’t cuss, doted on children and could reload and fire a double-barreled, muzzle-loading shotgun faster than anyone else around,” said Moulds. “Even as an old man, if someone rubbed him the wrong way, he’d have a knife at their throat in a heartbeat. A lot of people will tell you that Newt was just a renegade, out for himself, but there’s good evidence that he was a man of strong principles who was against secession, against slavery and pro-Union.”

Those views were not unusual in Jones County. Newt’s right-hand man, Jasper Collins, came from a big family of staunch Mississippi Unionists. He later named his son Ulysses Sherman Collins, after his two favorite Yankee generals, Ulysses S. Grant and William T. Sherman. “Down here, that’s like naming your son Adolf Hitler Collins,” said Moulds.

When secession fever swept across the South in 1860, Jones County was largely immune to it. Its secessionist candidate received only 24 votes, while the “cooperationist” candidate, John H. Powell, received 374. When Powell got to the secession convention in Jackson, however, he lost his nerve and voted to secede along with almost everyone else. Powell stayed away from Jones County for a while after that, and he was burned in effigy in Ellisville.

“In the Lost Cause mythology, the South was united, and secession had nothing to do with slavery,” said Moulds. “What happened in Jones County puts the lie to that, so the Lost Causers have to paint Newt as a common outlaw, and above all else, deny all traces of Unionism. With the movie coming out, they’re at it harder than ever.”



See more of William Widmer’s photographs of Mississippi at Smithsonian.com/jones



Although he was against secession, Knight voluntarily enlisted in the Confederate Army once the war began. We can only speculate about his reasons. He kept no diary and gave only one interview near the end of his life, to a New Orleans journalist named Meigs Frost. Knight said he'd enlisted with a group of local men to avoid being conscripted and then split up into different companies. But the leading scholar of the Knight-led rebellion, Victoria Bynum, author of *The Free State of Jones*, points out that Knight had enlisted, under no threat of conscription, a few months after the war began, in July 1861. She thinks he relished being a soldier.

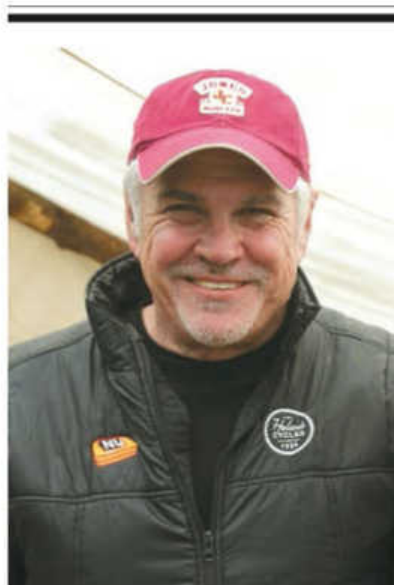
In October 1862, after the Confederate defeat at Corinth, Knight and many other Piney Woods men deserted from the Seventh Battalion of Mississippi Infantry. It wasn't just the starvation rations, arrogant harebrained leadership and appalling carnage. They were disgusted and angry about the recently passed "Twenty Negro Law," which exempted one white male for every 20 slaves owned on a plantation, from serving in the Confederate Army. Jasper Collins echoed many non-slaveholders across the South when he said, "This law . . . makes it a rich man's war and a poor man's fight."

Returning home, they found their wives struggling to keep up the farms and feed the children. Even more aggravating, the Confederate authorities had imposed an abusive, corrupt "tax in kind" system, by which they took what they wanted for the war effort—horses, hogs, chickens, corn, meat from the smokehouses, homespun cloth. A Confederate colonel named William N. Brown reported that corrupt tax officials had "done more to demoralize Jones County than the whole Yankee Army."

In early 1863, Knight was captured for desertion and possibly tortured. Some scholars think he was pressed back into service for the Siege of Vicksburg, but there's no solid evidence that he was there. After Vicksburg fell, in July 1863, there was a mass exodus of

deserters from the Confederate Army, including many from Jones and the surrounding counties. The following month, Confederate Maj. Amos McLemore arrived in Ellisville and began hunting them down with soldiers and hounds. By October, he had captured more than 100 deserters, and exchanged threatening messages with Newt Knight, who was back on his ruined farm on the Jasper County border.

On the night of October 5, Major McLemore was staying at his friend Amos Deason's mansion in Ellisville, when someone—almost certainly Newt Knight—burst in and shot him to death. Soon afterward, there was a mass meeting of deserters from four Piney Woods counties. They organized themselves into a company called the Jones County Scouts and unanimously elected Knight as their



Director Gary Ross (above) recreates the world of Newt Knight, where the pro-Union rebels escaped into local swamps. "My heart lay here," says Ross of his decade-long effort to bring the story to the screen.

captain. They vowed to resist capture, defy tax collectors, defend each other's homes and farms, and do what they could to aid the Union.

Neo-Confederate historians have denied the Scouts' loyalty to the



Union up and down, but it was accepted by local Confederates at the time. "They were Union soldiers from principle," Maj. Joel E. Welborn, their former commanding officer in the Seventh Mississippi, later recalled. "They were making an effort to be mustered into the U.S. Service." Indeed, several of the Jones County Scouts later succeeded in joining the Union Army in New Orleans.

In March 1864, Lt. Gen. Leonidas



Polk informed Jefferson Davis, the president of the Confederacy, that Jones County was in “open rebellion” and that guerrilla fighters were “proclaiming themselves ‘Southern Yankees.’” They had crippled the tax collection system, seized and redistributed Confederate supplies, and killed and driven out Confederate officials and loyalists, not just in Jones County but all over southeast Mississippi. Confederate Capt. Wirt Thompson reported that they were

now a thousand strong and flying the U.S. flag over the Jones County courthouse—“they boast of fighting for the Union,” he added.

That spring was the high-water mark of the rebellion against the Rebels. Polk ordered two battle-hardened regiments into southeast Mississippi, under the command of Piney Woods native Col. Robert Lowry. With hanging ropes and packs of vicious, man-hunting dogs, they subdued the sur-

rounding counties and then moved into the Free State of Jones. Several of the Knight company were mangled by the dogs, and at least ten were hanged, but Lowry couldn’t catch Knight or the core group. They were deep in the swamps, being supplied with food and information by local sympathizers and slaves, most notably Rachel.

After Lowry left, proclaiming victory, Knight and his men emerged from their hide-outs, and once again, began

threatening Confederate officials and agents, burning bridges and destroying railroads to thwart the Rebel Army, and raiding food supplies intended for the troops. They fought their last skirmish at Sal's Battery, also spelled Sallsbattery, on January 10, 1865, fighting off a combined force of cavalry and infantry. Three months later, the Confederacy fell.

In 2006, the filmmaker Gary Ross was at Universal Studios, discussing possible projects, when a development executive gave him a brief, one-page treatment about Newton Knight and the Free State of Jones. Ross was instantly intrigued, both by the character and the revelation of Unionism in Mississippi, the most deeply Southern state of all.

"It led me on a deep dive to understand more and more about him and the fact that the South wasn't monolithic during the Civil War," says Ross, speaking on the phone from New York. "I didn't realize it was going to be two years of research before I began writing the screenplay."

The first thing he did was take a canoe trip down the Leaf River, to get a feel for the area. Then he started reading, beginning with the five (now six) books about Newton Knight. That led into broader reading about other pockets of Unionism in the South. Then he started into Reconstruction.

"I'm not a fast reader, nor am I an academic," he says, "although I guess I've become an amateur one." He apprenticed himself to some of the leading authorities in the field, including Harvard's John Stauffer and Steven Hahn at the University of Pennsylvania. (At the urging of Ross, Stauffer and co-author Sally Jenkins published their own book on the Jones County rebellion, in 2009.) Ross talks about these scholars in a tone of worship and adulation, as if they're rock stars or movie stars—and none more so than Eric Foner at Columbia, the dean of Reconstruction experts.

"He is like a god, and I went into his office, and I said, 'My name's Gary Ross, I did *Seabiscuit*.' I asked him a bunch of questions about Reconstruction, and all

he did was give me a reading list. He was giving me no quarter. I'm some Hollywood guy, you know, and he wanted to see if I could do the work."

Ross worked his way slowly and carefully through the books, and went back with more questions. Foner answered none of them, just gave him another reading list. Ross read those books too, and went back again with burning questions. This time Foner actually looked at him and said, "Not bad. You ought to think about studying this."

"It was the greatest compliment a person could have given me," says Ross. "I remember walking out of his office, across the steps of Columbia library, almost buoyant. It was such a heady experience to learn for learning's sake, for the first time, rather than to generate a screenplay. I'm still reading history books all the time. I tell people this



Joseph Hosey, a Jones County forester who was an extra on the film, honors Knight's legacy. "One of the things we do is clean up the graves. We keep Newt's grave looking nice, and Rachel's. We're proud to do it."

movie is my academic midlife crisis."

In Hollywood, he says, the executives were extremely supportive of his research, and the script that he finally wrestled out of it, but they balked at financing the film. "This was before *Lincoln* and *12 Years a Slave*, and it was

very hard to get this sort of a drama made. So I went and did *Hunger Games*, but always keeping an eye on this."

Matthew McConaughey thought the *Free State of Jones* script was the most exciting Civil War story he had ever read, and knew immediately that he wanted to play Newt Knight. In Knight's defiance of both the Confederate Army and the deepest taboos of Southern culture McConaughey sees an uncompromising and deeply moral leader. He was "a man who lived by the Bible and the barrel of a shotgun," McConaughey says in an email. "If someone—no matter what their color—was being mistreated or being used, if a poor person was being used by someone to get rich, that was a simple wrong that needed to be righted in Newt's eyes. . . . He did so deliberately, and to the hell with the consequences." McConaughey sums him up as a "shining light through the middle of this country's bloodiest fight. I really kind of marveled at him."

The third act of the film takes place in Mississippi after the Civil War. There was a phase during early Reconstruction when blacks could vote, and black officials were elected for the first time. Then former Confederates violently took back control of the state and implemented a kind of second slavery for African-Americans. Once again disenfranchised, and terrorized by the Klan, they were exploited through sharecropping and legally segregated. "The third act is what makes this story feel so alive," says McConaughey. "It makes it relevant today. Reconstruction is a verb that's ongoing."

Ross thinks Knight's character and beliefs are most clearly revealed by his actions after the war. He was hired by the Reconstruction government to free black children from white masters who were refusing to emancipate them. "In 1875, he accepts a commission in what was essentially an all-black regiment," says Ross. "His job was to defend the rights of freed African-Americans in one of Mississippi's bloodiest elections. His commitment to these issues never waned." In 1876, Knight deeded 160 acres of land to Rachel, making her one of very few African-American landowners in Mississippi at that time.

Much as Ross wanted to shoot the movie in Jones County, there were irresistible tax incentives to film across the border in Louisiana, and some breathtaking cypress swamps where various cast members were infested with the tiny mites known as chiggers. Nevertheless, Ross and McConaughey spent a lot of time in Jones County, persuading many county residents to appear in the film.

"I love the Leaf River and the whole area," says Ross. "And I've grown to love Mississippi absolutely. It's a very interesting, real and complicated place."

On the website of Jones County Rosin Heels, the local chapter of the Sons of the Confederate Veterans, an announcement warned that the film will portray Newt Knight as a civil rights activist and a hero. Then the writer inadvertently slips into the present tense: "He is actually a thief, murderer, adulterer and a deserter."

Doug Jefcoate was listed as camp commander. I found him listed as a veterinarian in Laurel, and called up, saying I was interested in his opinions on Newt Knight. He sounded slightly impatient, then said, "OK, I'm a history guy and a fourth-generation guy. Come to the animal hospital tomorrow."

The receptionist led me into a small examining room and closed both its

out he is Doug Jefcoate, without the "e.")

He laughed uproariously, then settled down and gave me his thoughts. "I'm not a racist, OK, but I am a segregationist," he said. "And ol' Newt was skinny-dipping in the wrong pool."

The Rosin Heel commander Doug Jefcoate wasn't available, so I went instead to the law offices of Carl Ford, a Rosin Heel who had unsuccessfully defended Sam Bowers, the imperial wizard of the White Knights of the Ku Klux Klan, in his 1998 trial for the 1966 murder of civil rights activist Vernon Dahmer. Ford wasn't there, but he'd arranged for John Cox, a friend, colleague and fellow Rosin Heel, to set me straight about Newt Knight.

Cox, an animated 71-year-old radio and television announcer with a long white beard, welcomed me into a small office crammed with video equipment and Confederate memorabilia. He was working on a film called *Free State of Jones: The Republic That Never Was*, intended to refute Gary Ross' film. All he had so far was the credits (Executive Producer Carl Ford) and the introductory banjo music.

"Newt is what we call trailer trash," he said in a booming baritone drawl. "I wouldn't have him in my house. And like all poor, white, ignorant trash, he was in it for himself. Some people are far too

circling back to denounce Newt Knight and the simpering fools who tried to project their liberal agendas on him.

"There was no Free State of Jones," he concluded. "It never existed."

Joseph Hosey is a Jones County forester and wild mushroom harvester who was hired as an extra for the movie and ended up playing a core member of the Knight Company. Looking at him, there's no reason to ask why. Scruffy and rail-thin with piercing blue eyes and a full beard, he looks like he subsists on Confederate Army rations and the occasional squirrel.

He wanted to meet me at Jitters Coffeehouse & Bookstore in Laurel, so he could show me an old map on the wall. It depicts Jones County as Davis County, and Ellisville as Leesburg. "After 1865, Jones County was so notorious that the local Confederates were ashamed to be associated with it," he says. "So they got the county renamed after Jefferson Davis, and Ellisville after Robert E. Lee. A few years later, there was a vote on it, and the names were changed back. Thank God, because that would have sucked."

Like his grandfather before him, Hosey is a great admirer of Newt Knight. Long before the film, when people asked where he was from, he

"WE HAVE CLOSE RELATIVES WHO WON'T EVEN LOOK AT US,"
SAYS BLAYLOCK. **"OR THEY'LL BE NICE TO US IN PRIVATE, AND**
PRETEND THEY DON'T KNOW US IN PUBLIC," ADDED MARSH.

doors. I stood there for a few long minutes, with a shiny steel table and, on the wall, a Bible quotation. Then Jefcoate walked in, a middle-aged man with sandy hair, glasses and a faraway smile. He was carrying two huge, leather-bound volumes of his family genealogy.

He gave me ten minutes on his family tree, and when I interrupted to ask about the Rosin Heels and Newt Knight, he stopped, looked puzzled, and began to chuckle. "You've got the wrong Doug Jefcoate," he said. "I'm not that guy." (Turns

enamored of the idea that he was Martin Luther King, and these are the same people who believe the War Between the States was about slavery, when nothing could be further from the truth.")

There seemed no point in arguing with him, and it was almost impossible to get a word in, so I sat there scribbling as he launched into a long monologue that defended slavery and the first incarnation of the Klan, burrowed deep into obscure Civil War battle minutiae, denied all charges of racism, and kept

would say, "The Free State of Jones." Now he has a dog named Newt, and describes it as a "Union-blue Doberman."

Being in the film, acting and interacting with Matthew McConaughey, was a profound and moving experience, but not because of the actor's fame. "It was like Newt himself was standing right there in front of me. It made me really wish my grandfather was still alive, because we were always saying someone should make a movie about Newt." Hosey and the other actors in

the Knight Company bonded closely during the shoot and still refer to themselves as the Knight Company. “We have get-togethers in Jones County, and I imagine we always will,” he says.

I ask him what he admires most about Knight. “When you grow up in the South, you hear all the time about your ‘heritage,’ like it’s the greatest thing there is,” he says. “When I hear that word, I think of grits and sweet tea, but mostly I think about slavery and racism, and it pains me. Newt Knight gives me something in my heritage, as a white Southerner, that I can feel proud about. We didn’t all go along with it.”

After Reconstruction, with the former Confederates back in charge, the Klan after him, and Jim Crow segregation laws being passed, Knight retreated from public life to his homestead on the Jasper County border, which he shared with Rachel until her death in 1889, and continued to share with her children and grandchildren. He lived the self-sufficient life of a yeoman Piney Woods farmer, doted on his swelling ranks of children and grandchildren, and withdrew completely from white society.

He gave that single long interview in 1921, revealing a laconic sense of humor and a strong sense of right and wrong, and he died the following year, in February 1922. He was 84 years old. Joseph Hosey took me to Newt’s granddaughter’s cabin, where some say that he suffered a fatal heart attack while dancing on the porch. Hosey really wanted to take me to Newt Knight’s grave. But the sacred rite of hunting season was underway, and the landowner didn’t want visitors disturbing the deer in the area. So Hosey drove up to the locked gate, and then swiped up the relevant photographs on his phone.

Newt’s grave has an emblem of Sal, his beloved shotgun, and the legend, “He Lived For Others.” He’d given instructions that he should be buried here with Rachel. “It was illegal for blacks and whites to be buried in the same cemetery,” says Hosey. “Newt didn’t give a damn. Even in death, he defied them.”

There were several times in Jones County when my head began to swim.

During my final interview, across a brightly colored plastic table in the McDonald’s in Laurel, there were moments when my brain seized up altogether, and I would sit there stunned, unable to grasp what I was hearing. The two sisters sitting across the table were gently amused. They had seen this many times before. It was, in fact, the normal reaction when they tried to explain their family tree to outsiders.

Dorothy Knight Marsh and Florence Knight Blaylock are the great-granddaughters of Newt and Rachel. After many decades of living in the outside world, they are back in Soso, Mississippi, dealing with prejudice from all directions. The worst of it comes from within their extended family. “We



As great-granddaughters of Newt and Rachel (a portrait tentatively identified as her, above), Dorothy Knight Marsh, left, and Florence Knight Blaylock revere their past: “It’s a very unusual, complex family,” says Blaylock.

have close relatives who won’t even look at us,” says Blaylock, the older sister, who was often taken for Mexican when she lived in California.

“Or they’ll be nice to us in private, and pretend they don’t know us in public,”



added Marsh, who lived in Washington, D.C. for decades. For simplification, she said that there were three basic groups. The White Knights are descended from Newt and Serena, are often pro-Confederate, and proud of their pure white bloodlines. (In 1951, one of them, Ethel Knight, published a vitriolic indictment of Newt as a traitor to the Confederacy.) The Black Knights are descended from Newt’s cousin Dan, who had children with one of his slaves. The White Ne-



groes (a.k.a. the Fair Knights or Knight Negroes) are descended from Newt and Rachel. “They all have separate family reunions,” said Blaylock.

The White Negro line was complicated further by Georgeanne, Rachel’s daughter by another white man. After Rachel died, Newt and Georgeanne had children. “He was a family man all right!” said Marsh. “I guess that’s why he had three of them. And he kept trying to marry out the color, so we would all

keep getting lighter-skinned. We have to tell our young people, do not date in the Soso area. But we’re all fine. We don’t have any . . . problems. All Knights are hardworking and very capable.”

In the film, Marsh and Blaylock appear briefly in a courthouse scene. For the two of them, the Knight family saga has continued into the 20th century and beyond. Their cousin Davis Knight, who looked white and claimed to be white, was tried for the crime of miscegenation in 1948,

after marrying a white woman. The trial was a study in Mississippian absurdity, paradox, contradiction and racial obsessiveness. A white man was convicted of being black; the conviction was overturned; he became legally white again.

“We’ve come to terms with who we are,” says Blaylock. “I’m proud to be descended from Newt and Rachel. I have so much respect for both of them.”

“Absolutely,” says Marsh. “And we can’t wait to see this movie.”



THE LOST WORLD

The insatiable global hunger for palm oil and timber are closing in on **Borneo's** last hunter-gatherers and their ancient way of life

by ALEX SHOUMATOFF
photographs by VARIAL



Tropical
hardwoods wait
to be milled into
boards near the
coastal city of Miri.



THERE'S A MAGIC MOMENT IN THE TROPICS, 15 minutes before sunset, when the horizontal shafts of the sinking sun filter through the surface vapor. The foliage turns iridescent blue and everything glows. I'm watching this transformation through the window of a silver Mitsubishi 4 x 4 pickup as we rise into Borneo's dramatic central highlands. We pass a looming jungle-smothered limestone spire, then a long waterfall spilling over a ledge. At the top of a knife-edged ridge, we look out on a 50-mile vista of nothing but rainforest and mist-filled valleys, with the 7,795-foot Mount Mulu rising in the distance. We can even see the curvature of the earth.

On closer inspection, we see that all the ridges in the foreground have logging roads on them, like the one we are on. There are eroded gashes on the hillsides where big trees, cut

into 30- to 40-foot lengths, were slid down to the valley floors. We hear the rumble of logging trucks down below.

Borneo's epic rainforests are being cleared at a faster rate per acre than the Amazon's. This might seem like a minor concern, since the island accounts for only 1 percent of the earth's land. But according to the World Wildlife Fund, Borneo's forests hold 6 percent of the planet's plant and animal spe-

cies. Many are now being driven toward extinction, or being extinguished before they can even be identified—all because of consumer demands around the world. Timber companies fell the ancient trees and export their wood, mostly to other Asian nations. The palm oil industry follows closely, clearing the land for enormous plantations. Ninety percent of Borneo's primary forest cover is now gone, along with some

of the tallest tropical trees in the world. In their place, much of the island is now covered with a tossing ocean of oil palm trees. The oil they produce goes out to markets in the United States, Europe and just about everywhere else: It's an essential ingredient in processed foods, baked goods, ice cream, cosmetics, cleaning agents, biodiesel, toothpaste, shampoo and countless other products.

I've come to Borneo to camp with a



group of Penan hunter-gatherers who live the way their ancestors did, in raised huts that they throw up in no time at all, hunting with blowguns and moving every few months to a new encampment. Of the 10,000 or so Penan on Borneo, only several dozen are still semi-nomadic. The island's deforestation, along with a series of proposed massive dams, is impacting their way of life, just as it's threatening the orangutan, the pygmy hippo and many other living things on the island. As these hunter-gatherers roam their 7,400-acre homeland, they know the big corporations are never far behind.

Our journey began early in the morning in Miri, in the Malaysian state of

Sarawak. Miri is a teeming coastal city of about 300,000 people. Most of the state's milled lumber and processed palm oil are shipped abroad from here. These industries, along with oil and gas, have endowed Miri with nice restaurants, manicured parks and a steady stream of tourists.

As we gathered provisions in the midday sun, Christmas carols blasted from overhead loudspeakers all over the city. Not surprisingly, many of the products we threw into the shopping cart contained palm oil: the canned evaporated milk, the crackers, the pasta, the peanut butter, the freeze-dried noodle soup. In the United States, Canada, Australia and En-

gland, an estimated 40 to 50 percent of supermarket and drugstore items contain palm oil. Over the past 25 years, the global output has grown from 14.5 million to 61 million tons a year—making palm oil a \$40 billion industry—and the land covered by oil palm plantations grew from 15 million to 40 million acres. And Malaysia and Indonesia produce 85 percent of the world's supply. Over Borneo's central ridge, in the Indonesian portion of the island, orangutans have lost 50 per-

Deforested hills near Long Bedian will soon be converted into an oil palm plantation (above). The site is about 300 feet above sea level, an ideal elevation for growing the crop.



cent of their forest habitat in the last two decades (see “Code Orange,” p. 92).

Before we left the store, we added a 50-pound bag of rice, coffee, tins of sardines, plates and cutlery, a big cook pot, a frying pan and spatula, and a big case of plastic-bottled water. “If they ask why we need all this stuff, say we’re going to Mulu National Park, not to the Penan,” whispered my guide, a laid-back guy in his 40s. “Foreign activists, outside agitators, are not popular in Sarawak.”

Now, some eight hours later, darkness is falling as we approach the Baram River at Long Lama. We drive the pickup onto a ferry, and when we reach the other side, we’re in the land of the Orang Ulu—the 20 or so tribes who live in the mountainous jungle of Borneo’s interior. My guide is a member of another one of these groups, but he grew up deep in the forest with the Penan and speaks their language. He’s been mapping the Penans’ traditional hunting grounds using GPS in the hope they will be recognized by the courts in Kuching, Sarawak’s capital city: According to Malaysian law, ethnic lands can be deemed “customary” if the group farmed them before 1958. But there’s currently no protection for hunting grounds, and my guide knows his efforts may be futile—especially because the longtime former chief minister of Sarawak state, Abdul Taib Mahmud, seems to have profited tremendously from the state’s deforestation. He and his extended family have reportedly made more than \$15 billion from timber and oil palm licensing and exports.

A torrential rain starts to pour down. The steep logging roads become treacherous and our progress slows. At one point, my guide’s furious last-minute steering keeps us from plunging into a deep gorge. We pass trucks laden with huge logs: Some have pulled over because of the dangerous conditions and others are coming right at us.

At around 9, we approach a Penan settlement and decide to stay the night. This is not the group we’ve come to visit: The majority of Penan, and all the other Orang Ulu, now live in settlements. They supplement their diets by hunt-



ing in the forest, but they come home to modern longhouses with zinc roofs. In this village, a long concrete walkway leads to a small shop selling junk food, cigarettes and soda. We’re welcomed into a flat occupied by an extended family. There’s a large room floored with linoleum, where several kids and women are watching TV. Beans boil on a gas stove. A woman washes vegetables in the sink. In back are an outhouse and several large barrels of water with a faucet for doing laundry.

The next morning, I go down to the river that curves sharply around a

wall of shale and ease myself into the muddy brown water. A young woman arrives after a few minutes and, giggling, performs her ablutions facing the other way. Across the river is thick rainforest. A bird keeps letting out a four-note call that sounds like a bell chime, or a ringing cellphone.

Heading back to the longhouse, I pass a large clearing where a *babui*, or a Bornean bearded pig, is chasing a boy on a dirt bike. After the Penan kill an animal, they adopt its orphaned babies as pets until they are old enough to return to the forest. The orphan is



Radu (seated inside the shack on the left) is the last traditional *sape* player in the community of Long Mera'am.

over bridges and forks off in several directions. Each ridge takes us higher, until we are close to 2,500 feet. Soon, we reach a place where clothes are drying on a line between two poles. Four dirt bikes are parked nearby. We've found the Ba Marong band.

The camp is 150 yards from the road. We hear chatter and laughter floating down the steep, muddy trail. Several young men appear and help us carry our bags and provisions up to a flat area, where we see four huts raised on poles lashed with strands of *rotan*, or rattan palm vines, from the forest. At the front of each hut's pole floor, a fire burns in an earthen hearth and pots hang over the flames, a stack of machete-split wood off to one side. The interior of the hut is for eating, sleeping, sitting and talking, and weaving baskets and bracelets.

There are 23 people here. All of them are under 35 except a stout, strong-faced woman in her 50s named Choeling who is weaving nine-yard strands of *rotan* that cascade down the side of her hut. Her husband, the group's headman, died last year. The current headman is married to her daughter, who is here with her own five daughters. These people are strikingly good-looking, glowing with fitness and well-being. The headman, Sagung, has a wispy mustache and elaborate dragon tattoos on his arms and torso, along with dozens of woven bracelets, some plastic rings and a wristwatch. He looks like a martial arts master from central casting.

In the other two huts are a young couple with an infant, and three young women with their babies. Three teenage boys are migrating among the four huts. In fact, everybody is constantly visiting each other's huts. It's a cozy scene, the way humans have lived from time immemorial, though there are some modern amenities as well: a CD player, flashlights, flip-flops, store-bought clothes and disposable diapers from Long Bedian, the trading center we passed several hours back.

known as *molong*, which has several other meanings. If you *molong* a sago palm, you lay claim to it for your family's exclusive use. The Penan also use *molong* to describe the conservationist principle of taking no more than you need. If the forest is going to provide for you, you can't clean it out.

Ian Mackenzie, an ethnographer and linguist who has lived with the Penan on and off for almost 25 years, warns that this ecological definition of *molong* is an entirely Western projection. Indeed, when the Penan use the word in this way, it can be hard to tell

whether they're reflecting a foreign notion of the "ecologically noble savage." But based on everything I observed, Penans have absorbed this definition of *molong* into their own culture, the way they merged the Christian God with their own traditional pantheon of spirits. They may have adopted this concept initially for the benefit of foreign tourists, but acculturated Penans now insist it's the most important value they have to offer the world.

Back in the pickup, we travel a road that sinks down into valleys, passes

Although the Ba Marong live in raised-pole huts, they have close contact with the modern world.





Half a dozen emaciated dogs are snoozing under the huts. They spring to life when it's time to go out with the hunters, or when they smell something cooking and know scraps and bones might be thrown their way. This camp is only three days old. Anticipating our arrival, the Penan built it nearer the road than they usually do so it would be easier for us to find.

The kids are full of beans and constantly playing in the huts, in the forest, down by the stream. Some of them have runny noses and mildly elevated temperatures, and their mothers ask if I have medicine. I give the women the small aspirins I take as a heart attack preventive, and it seems to do some good. But these balmy highlands are incredibly salubrious. In the course of this trip, I will lose 20 pounds.

There are few mosquitoes up here. I was worried about leeches, but there

which contains seven or eight different worlds. Today, I am almost certain he is the last good Penan informant."

One night in the Ba Marong camp, I ask a young man named Nelson to tell me about the old ways. "Because we are now Christian, we only believe in Lord Jesus," he says cautiously. "I know there are other spirits, but I do not belong to them anymore." He goes on, though. Every living thing has a spirit, and humans can harness it. "The horn-bill spirit can make people walk very fast. Normally what takes two, three days to walk, they do it in one. The leopard spirit is even more powerful."

I've heard similar animal-human transformation myths from Amazon Indians, Pygmies in Africa and bushmen. Hunter-gatherers have to be fully engaged in the unfathomably intricate ecosystems around them. The forest gives them everything, but learning to

"Money is killing the world," says Babulu, a 70-year-old former headman in a half-finished Penan village near Mulu park.

This way of thinking can be hard to put into words. As Gerardo Reichel-Dolmatoff, the anthropologist of the Colombian Amazon, reflected in 1987: "I did not find the 'noble savage.' . . . What I did find was a world with a philosophy so coherent, with morals so high, with social and political organizations of great complexity, and with sound environmental management based on well-founded knowledge."

Or, as Nelson tells me, "The knowledge about the nature, you can ask every man anywhere, but there is no one who can teach you. Even Penan don't know how to teach you the experience we have. It's so deep."

There's a common romantic notion that the Penan have been hunter-gatherers since the dawn of time. In fact, Mackenzie told me, they were most likely farmers who migrated from Taiwan between 5,000 and 2,500 B.C. Once they got to Borneo, the Penan left farming behind and started living entirely off the abundant game, fruits, nuts and sago palm. Unlike other Orang Ulu, they never made war on other groups or took heads as trophies; they had no need for land to farm and it wouldn't have made sense for them to lug a bunch of skulls around as they wandered from place to place. They kept living in this nomadic way until after World War II, when missionaries began to penetrate what was still one of the least-known quarters of the world.

One morning in the camp, after a night of pouring rain, the sun comes up over the ridge into clear blue sky and shines through the gap in the trees. The forest's day shift comes to life. We hear a chorus of gibbons down in the valley, then the crickets, then the six o'clock cicadas starting their grating B-flat drone. They do this every day of the year at dawn and dusk, followed by other kinds of cicadas with different songs. Asian paradise flycatchers and other birds come in. The morning biophony, *tutti specie*.

THE FOREST GIVES THEM EVERYTHING, BUT LEARNING TO SURVIVE IN IT—WITHOUT PROVOKING **THE GHOSTS OF THE DEAD OR THE SPIRITS OF THE ANIMALS** AND THE TREES—IS A COMPLETELY ABSORBING, LIFELONG PROCESS.

are not many. The ones we do find are small and easily pinched off, and their wound is antiseptic. You can feel the suction on both ends as they move across your palm. They have both male and female sexual organs—leeches are hermaphroditic.

I've heard a Penan myth about leeches—how demons create them out of the veins of dead people. Mackenzie, the source of this story, told me it took him a long time to gather traditional teachings like this. "The missionaries had anathematized the old beliefs, so most people had willfully forgotten them," he said. "After seven years, I came to a group I'd never visited. There I met Galang, who, though nominally Christian, knew all the myths, and after some years trusted me enough to disclose the secrets of their cosmos,

survive in it—without provoking the ghosts of the dead or the spirits of the animals and the trees—is a completely absorbing, lifelong process.

A three-inch-long green praying mantis lands on my plate. Hundreds of ephemerids swarm the light from our cooking fire. "The most important thing about being in the forest is to look after your own self so there will be no problem," Nelson continues. "The first thing in the forest is smell. It can tell you something. You smell what food is being cooked. The smell of a tree fallen, the smell of an animal that pissed three hours ago. I can smell the durian fruit in your plastic bag." He promises to show me the next day how the spirit talks to his people. "What I wish to show you tomorrow is this is not magic but the reality."



THE PALM OIL PARADOX

It's destroying the rainforests, but boycotting isn't the answer

The \$40 billion palm oil industry is notorious for wiping out rainforests, displacing indigenous peoples, spewing carbon into the atmosphere and driving the orangutan and other animals toward extinction. But consumers who want to avoid palm oil have an almost impossible task because it's in everything from ice cream to instant ramen, toothpaste to lipstick. And it's increasingly apparent that even if they could boycott the stuff, that might not be so wise: As destructive as the oil palm is to the environment, it may be better than the alternatives. No other crop can yield even a third as much oil per acre planted. And along with using less land, the oil palm gobbles up significantly fewer pesticides and chemical fertilizers than coconut, corn or any other vegetable oil source.

Palm oil's big problem has always been the jungle-covered terrain where the tree is grown. It's native to Africa, but Malaysia and Indonesia now produce 85 percent of the world's supply. Clearing land for plantations involves burning rainforest—in the process, endangering rare species and, on peatland, releasing 100 times the greenhouse gas of conventional forest fires.

And demand is growing: By 2022, the global market is expected to more than double in value to \$88 billion.

Environmental groups have pushed for change. Under pressure from Greenpeace the world's largest palm oil trader, Wilmar International, signed a 100 percent zero-deforestation agreement in 2013. Public outcry also moved the European Union to change its labeling laws in 2014, making it easier to spot palm oil on ingredient lists. (The U.S. has required label-

ing of specific oils since 1976.) Concerned buyers can also look for a seal of approval from the Roundtable on Sustainable Palm Oil (RSPO). Some critics argue that the RSPO, founded in 2004 by industry leaders, doesn't go far enough: Its standards forbid deforestation only in "high conservation value areas," a term that has no legal definition. And a trader who earns an RSPO certificate can go on to mix "clean" and uncertified oil. What's more, the world's largest palm oil markets are in India, China and Indonesia, where most consumers—who use it for cooking—may not even be aware of such options.

Still, more big food companies are getting the message. On its 2015 sustainable palm oil scorecard, the Union of Concerned Scientists gave high ratings to such companies as Gerber, Kellogg's, Unilever, General Mills, PepsiCo, Dunkin' Donuts and Safeway. Environmental NGOs ultimately hope to see oil palm growers planting on already-deforested land. In the meantime, they warn against boycotting palm oil altogether. "That would mean shifting problems onto another commodity," says Katie McCoy,

the head of forest programs at CDP (formerly the Carbon Disclosure Project). Moreover, from a health perspective, palm oil is the ideal substitute for partially

hydrogenated oils, the "trans fats" that food processors love and health experts hate. Palm oil is semisolid at room temperature and can stay stable for long periods without going rancid. Sustainable palm oil may be elusive, but it's possible—and, in fact, it may even be necessary for the planet's healthy future. —JOE FASSLER



Choeling, stoking the fire in her hut, sings a traditional song to the men:

*Wake up, don't you hear the gibbon?
It's time to go hunting.*

*I will stay and prepare to cook what
you bring.*

*You wake up in the morning before
the clouds rise up in the sky.*

*You are already moving like the leopard,
through the hills and mountains.*

*But I am still not prepared for your
return.*

Sagung and one of the young men have already gone off with the dogs and their shotguns. Why not blowguns? "They are taking shotguns because they want to make it faster," Nelson says. "They don't want to waste time in the forest with you here. If they have bullets, they prefer the shotgun."

Breakfast is barking deer, also known as muntjac, and a thick, gelatinous porridge of sago palm. Everybody is sticking a wooden utensil with four prongs into the porridge and swirling it, dunking the blob that gloms onto it into venison juice. Yesterday it was sago porridge with small tree snails.

Several drongos, black songbirds with forked tails, land in the treetops to check us out. I ask about the clouded leopard, the biggest of Borneo's spotted cats, protected under Malaysian law. There are still some, but not many. Sagung killed one last year. He is wearing one of its teeth around his neck. Pythons are everywhere, in the forest and in the rivers, Nelson says. Sagung's father-in-law once had a python wrapped around his leg. It tried to kill him, but luckily he had his machete.

The hunters return with a big dead babui and four dead silvered leaf monkeys. They also bring back a live silvered leaf infant and lash it to a post of Sagung's hut. It looks on with what I can only imagine is horror and sorrow as its parents' bodies are thrown on the lashed-pole floor and butchered. Sagung's father guts the pig and scoops out the copious amount of blood and innards into a bowl. Then the five animals are roasted in their skin and



Sagung roasts the morning's hunt. The silvered leaf monkey is seriously threatened by both logging and hunting.

smoked on a big fire that Sagung makes in the middle of the camp. Food for everybody for the next few days. (A vegetarian, I'll be sticking to the canned goods and produce I brought with me from the grocery store in Miri.)

After lunch and a nap, we set out into the forest. Sagung's 10-year-old daughter brings along the silvered leaf monkey and showers it with affection. Imprinting on its new, furless caregivers, the animal seems decidedly less traumatized by the death of its parents, who are now in the Ba Marongs' stomachs.

Sagung's father and some of the children have gone ahead of us and left messages along the way, using bent and split branches. A branch bending slightly up to the right tells us the direction the advance party has taken. The next sign, a branch with crossed leaves in its fork, means the sign-sender is accompanied by two others, both family members. The next sign is

in a split sapling, a larger cross and a series of cuts: Hurry, don't waste time. A branch cut into four prongs, like a sago porridge swirler, leads us to a sago palm, which another sign declares *molong*—it's been claimed by Sagung's family. Sagung tells me the Ba Marong have a hundred of these signs. His father left them for us; the children no longer know them. Even forest-dwelling Penan kids spend much of their time visiting friends who live in long-houses, watching TV and using other modern amenities. Learning the old ways isn't high on their priority list.

Sagung hacks down the sago palm's multiple stems with their pinnate leaflets, cuts out a section of its yellowish white heart and chops it up. He passes around pieces. It's the best palmito I have ever had. Ambrosial.

Farther up the path, Sagung finds an agarwood tree and cuts out a yard-long section of its mold-blackened pith. The perfumed resin extracted from this tree has been esteemed for its fragrance and medical properties in China, India and

the Middle East for thousands of years. In the U.S., the best-grade agarwood can fetch \$5,000 a pound. The pith will bring Sagung good money when he sells it locally. One of the main reasons for the high cost of agarwood is that there is relatively little left in the wild. It's listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) as a potentially threatened species.

We wander through a forest of mixed second-growth dipterocarp—tropical lowland trees whose globular fruits have wings that slow them down as they fall from the canopy. They grow as high as 200 feet, their smooth gray bark spotted with luminous green bull's-eyes of lichen. Borneo is the dipterocarp center of the world. It has 267 of the 680 species. The tallest one ever measured, a 288-foot *Shorea fagueti-ana*, was in Sabah, Borneo's other Malaysian state. Some Penan believe these trees have particularly powerful spirits, and that angering them can bring all kinds of trouble.



The approach to Mulu park. A few Penan households cling to a nomadic existence within the park's protected boundaries.



CODE ORANGE

Orangutans face more peril than ever

During my first trip to Borneo, I visited Birute

Galdikas, the Canadian-born primatologist. One night at dinner, a furry orange hand quietly unlatched the door. An orangutan named Kristin sat down, tucked a napkin under her chin and started spooning up soup. As we chatted, Kristin gave each speaker her undivided attention. When she finished eating, she folded her napkin, put down her utensil and let herself out. Galdikas, who has spent more than 40 years trying to save the orange apes, told me Kristin had picked up these manners on her own, through observing humans.

There hasn't been a thorough census of wild Bornean orangutans since 2004—at that time, there were 54,000, and the number has almost certainly dropped with the spread of logging and oil palm plantations. “You could easily fit them all within one big sports stadium,” says Mark Harrison, managing director of the Orangutan Tropical Peatland Project. He estimates that last year’s agricultural fires, which raged unchecked for months, killed more than 2,000 orangutans: Many suffocated, while others died of starvation. Still others fled to villages, where they were attacked by locals. “What is very clear,” says Harrison, “is that the population is in sharp decline.” —A.S.

The destruction of these trees is playing out in three stages. First, timber companies go in and cut the commercial hardwoods. They call this “selective logging,” but the process of felling and removing these trees destroys most of the surrounding forest and cripples its ability to regenerate. In the lowlands, at least, this destructive logging doesn’t really matter, because step two burns off what is left of the forest. If it is peat swamp forest, the fire can burn for months with no easy way to put it out. These peat fires release more carbon than any other incinerated forest on earth. And at their worst, they shroud Southeast Asia in a pall of black smoke for months at a time, as they did last fall.

Step three is to plant oil palm wherever possible. The tree is native to the swamps and riverbanks of West Africa. The British discovered it could thrive in the steamy equatorial climate of Southeast Asia and put in the first plantations in Malaysia during World War I. The vast majority of the world’s palm oil now comes from converted forests in Indonesia and Malaysia.

There are no tall native trees left around the Ba Marong camp. All we find are their rotting stumps. The only tree we see emerging through the canopy is a towering *Alstonia pneumatophora*, whose wood is presumably too soft to be of commercial interest. It’s used to make the *sape*, the traditional sitar-like stringed instrument of the Orang Ulu.

According to my guide, the road below us was built and the big dipterocarps harvested during the early 1990s. At the time, various Penan groups were mounting protests to stop loggers from cutting the surrounding trees, but the Ba Marong were unable to save theirs. A Swiss activist named Bruno Manser brought international attention to the Penans’ plight. He arrived in Sarawak in 1984, part of an expedition to explore the extensive cave systems of Gunung Mulu National Park. After his British caving companions left, he set off on a quest to “learn from a people who still live

close to their source,” trekking alone into the interior, over Mount Mulu to its eastern side, where he found some still-nomadic Penan. He lived with them for six years and recorded their oral histories in his journals. His notebooks are full of watercolor portraits and sketches of the Penan going about their lives.

The nomadic Penan weren’t the only groups being threatened by Borneo’s deforestation. The Penan who lived in longhouses were also vulnerable. So were the other Orang Ulu, and the Dyak people on the southern, Indonesian side of the central ridge. Most of them lived and hunted in territories that weren’t officially recognized (and still aren’t today), and they were struggling to keep the chain saws and bulldozers out of their lands. Still, it was the nomadic Penan who captured Manser’s imagination. After seeing their game depleted, their rivers polluted and their *tana*, or customary hunting grounds, destroyed, he started helping them organize peaceful blockades against logging trucks. Rumors spread that the Malaysian authorities had put a bounty on his head. Manser was captured by police officers but escaped by leaping out of their vehicle and diving into a thundering cataract. Returning to Europe in 1990, he devoted the next ten years to rallying outside support for the Penan cause. For a while, the world took notice. In 1991, Al Gore, then a U.S. senator, condemned the logging activities in Sarawak, and in a speech at Kew Gardens, Prince Charles described the treatment of the Penan as part of a global “collective genocide.” Manser went on a 60-day hunger strike in front of the Federal Palace of Switzerland, in an attempt to inspire a ban on unsustainably harvested timber imports. Ultimately, though, none of those actions had much of an impact on Sarawak. In 2000, Manser slipped back over the Kalimantan border and headed for Bukit Batu Lawi, a 6,700-foot limestone pinnacle. He told the Penan who were helping carry his gear that he wanted to climb it alone and sent





A truck prepares to ferry across the Baram River, bringing its load of oil palm nuts to be milled.

them back to their band. That was May 2000. Manser was never seen again. The machete slash marks he left behind were tracked to the swamp at the base of the pinnacle. In August 2014, on what would have been Manser's 60th birthday, a new species of goblin spider was named in his honor: *Aposphragisma brunomanseri*. Vladimir Nabokov wrote that no form of immortality compares to a Latin species name. But given the way things are going in Borneo, how much longer will this goblin spider survive?

I'm reflecting on this at the end of my visit when Sagung asks for money to build a longhouse. I'm taken aback to learn that this group of nomadic Penan wants to move into a stationary dwelling. Sagung explains that he wants to establish a permanent pres-

ence on this land. It makes me wonder to what extent this camp has been a Potemkin village. During our visit, I've seen a stylishly dressed Chinese man, a representative of a timber firm, driving back and forth along the ridge. According to my guide, the company has already felled many of the trees in the Ba Marong territory, and it wants to pay them the equivalent of \$30 apiece to come in and do a second cut. Sagung claims he isn't going to give in, but more and more Penan groups are accepting offers like this.

I suspect that the Ba Marongs' wandering lifestyle is losing its appeal for other reasons, too. The members of this group move fluidly between the forest and their friends' longhouses down the road. After they've experienced what life is like with electricity, television and running water, it's not hard to understand why they might be hankering after a longhouse of their own. That doesn't mean they won't be gone for days at a time hunting babui and gathering sago palm, fruit and nuts

in the forest. But there's a reason so few Penans still live like the Ba Marong in raised pole huts. According to Mackenzie, that number has dropped from 300 to fewer than 50 during the past ten years. In another generation, that way of life will probably be gone.

After we leave the Ba Marong camp, we spend three glorious days in Gunung Mulu National Park, a Unesco World Heritage site. In 1978, the Royal Geographical Society embarked on a 15-month inventory of the park's flora and fauna, and researchers identified one of the largest collections of ants ever found in such a small area: 458 species. The lepidopterist J. D. Holloway was so blown away by what he found in the park that he undertook a monumental 18-volume series called *Moths of Borneo*. In Deer Cave, one of the largest subterranean chambers on earth, two million to three million free-tailed bats spend all day roosting from the ceiling. At dusk, they stream out of the cave in long floating ribbons, con-



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suming as many as 30 tons of insects per night and pollinating numerous trees and flowering plants. Animals ranging from barking and sambar deer to the gargantuan Rajah Brooke's bird-wing papilio butterfly consume the salts in the bat excrement. Mulu, the British scientists discovered, was a naturalist's paradise.

Brian Clark, Mulu's park manager, has nothing but praise for Sarawak's former chief minister. "Without Taib, we'd still be a backwater," he tells me. "He's developed the state and maintained peace between all the different tribes and races. Every country on earth has exploited its resources. The West can't condemn any country for it. Canada, the U.S.A., Africa—where isn't there deforestation? It's part of the nature of the beast."

I hear something different when I visit Long Mera'an, a community of several hundred people on the Mago River. The Penan who live here belong to the group Manser lived with between 1984 and 1990. At the time, they were nomadic, like the Ba Marong. They moved into a settlement in the 1990s, but their longhouse burned down, and then a logging company cleared their land to build an oil pipeline. The Mera'an had blockaded the pipeline three times. The fourth time, the state ministry in charge of pipeline routes negotiated a settlement of about \$53,500. At least some of that money went to build new dwellings and buy electric guitars and big speakers for the new church.

The new community consists of several dozen free-standing houses built in a variety of styles, from shacks to a few well-built two-story structures with gardens and fences. Many residents own dirt bikes, which they use to cross the narrow suspension bridge across the Mago River.

At Long Mera'an, I meet Radu, a master *sape* player. Through a translator, he tells me he learned his melodies from the birds in the forest, messengers of the spirit Balei Pu'un. "The world was not created by Balei Pu'un," says Radu. "It was already there. His

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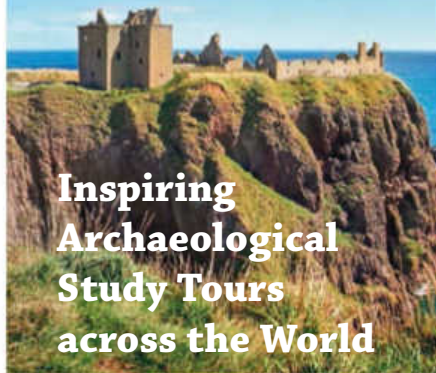
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job is to help people be good to each other. The way he communicates is through a bird or animal, because people cannot see him, so he needs a translator, a special person who is able to understand animals. My father was one of these people, and he taught me how to do it."

Is there a best time of day to hear Balei Pu'un speaking through the animals? "No time of day is better. If it happens, it happens." Where will Balei Pu'un go if the forest is destroyed? "He will try to find another place where there is still forest." What if there is no more forest anywhere? "We don't know, but it could be the end of the world." This is what the Penan believe. If their forest goes, it will be not only the end of them and the vast diversity of creatures who live there. The *balei*, the spirits who travel around the nine worlds of the Karawara, will also have nowhere to gather water and honey.

And what does this mean for the rest of us? Here in Borneo, I've been struck by the dramatic way people all over the world are shaping the fate of this island. The demand for tropical timber and palm oil is ending the Penans' way of life and extirpating hundreds of species found only on this island. It's also igniting peat fires that release more carbon dioxide than highways jammed with cars. If the deforestation continues at its current rate, there will be a cascade of negative impacts on everything from human health to the humid climate of Southeast Asia. The governments now promoting the logging and palm-oil industries will be crippled by the economic and ecological damage. And all of this will happen because of purchases made by consumers thousands of miles away. I, for one, am drastically cutting down on the number of palm-oil products I consume now that I've seen their hidden cost with my own eyes.

"We have to look after the whole thing," Radu tells me. "If people want to have more and more, they have to understand that without *molong* there is nothing left."

Chicago Doctor Invents Affordable Hearing Aid Outperforms Many Higher Priced Hearing Aids

Reported by J. Page

CHICAGO: A local board-certified Ear, Nose, and Throat (ENT) physician, Dr. S. Cherukuri, has shaken up the hearing aid industry with the invention of a medical-grade, affordable hearing aid. **This revolutionary hearing aid is designed to help millions of people with hearing loss who cannot afford—or do not wish to pay—the much higher cost of traditional hearing aids.**

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Dr. Cherukuri knew untreated hearing loss could lead to depression, social isolation, anxiety, and symptoms consistent with Alzheimer's disease. **He didn't know why hearing aids were so expensive when the prices on so many consumer electronics like TVs, DVD players, cell phones, and digital cameras had fallen.**

Since Medicare and most private insurance plans do not cover the costs of hearing aids, which can cost between \$2,000-\$4,000 or a pair, many of the doctor's patients could not afford the expense. Dr. Cherukuri's goal was to find a solution that would help with the most common types of hearing loss at an affordable price, similar to the **“one-size-fits-most” reading glasses** available at drug stores.

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He evaluated numerous hearing devices and sound amplifiers, including those seen on television. Without fail, those were found to amplify bass/low frequencies (below 1000 Hz) and were not effective at amplifying the frequencies related to the human voice.

Inspiration from a Surprising Source

The doctor's inspiration to defeat the powers-that-be that kept inexpensive hearing aids out of the hands of the public actually came from a cell phone he had just purchased. **“I felt that if someone could develop an affordable device like an iPhone® for about \$200 that could do all sorts of things, I could create a hearing aid at a similar price.”**

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Snow Leopards

CONTINUED FROM PAGE 59

for sleeping. We sat cross-legged on the kitchen floor. The television, tuned to a station out of Bishkek, burred along agreeably in the background.

Yakut's wife appeared with bread and tea and old plastic soda bottles filled with kumiss, an alcoholic delicacy made from fermented mare's milk. The first gulp of kumiss came shooting back up my throat; it had the consistency of a raw oyster, and the taste of sour yogurt and vodka. I tried again. It was no better, but this time it went down. Yakut beamed.

I asked him what had made him agree to chair the conservancy, whether there was an appeal besides additional income for the village. "I used to go up into the mountains and see a snow leopard almost every other day," he said. "Now, months and months can go by before I see a single track. The animals have started to disappear." He explained that the other week, he and his fellow villagers had stopped a group of young hunters with bolt-action rifles who appeared to be headed onto the land, possibly in search of snow leopards. Perhaps they'd be back, but probably not—it would likely be more trouble than it was worth to attempt another incursion.

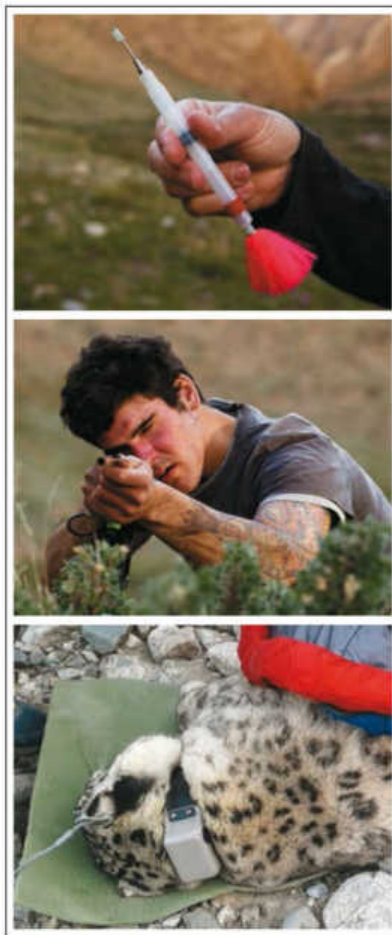
"My hope," Yakut continued, "is that one day, maybe when my grandchildren are grown, the snow leopards will start to return."

Outside, the sky was low-bellied and dark. Yakut gestured to the wall of his shed, where a wolf carcass hung. He and a cousin had trapped and killed it just the other day. The belly had been slit open and stuffed with hay to preserve the shape. Rosen, noticeably upset, turned away.

As she later told me, building community-based conservancies involved trade-offs: Some animals would be protected, but others would still be hunted. You knew that going in, but it didn't mean you had to like it.

That night, we slept on the floor of a hut owned by the head of a nearby conservancy. Tossing and turning in my

sleeping bag, I listened as Rosen, on the other side of the room, spoke by phone with her 11-year-old daughter, who was living with her father in New York. (Rosen divorced her first husband and has since remarried.) The conversation started in Italian, broke into English, and ended with a series of ciao's and blown kisses. Last year, Rosen's daughter joined her mother for a few weeks in the field, and Rosen hoped she'd visit Kyrgyzstan again soon. But in the meantime they would be apart for nearly half a year. The separation, she told me, was the single toughest part of her job.



Tracking snow leopard movements is critical to our understanding of their behavior. Above, scientist Shannon Kachel uses a dart gun to tranquilize an adult female last October—the first ever collared in Kyrgyzstan.



The most successful government conservancy in Kyrgyzstan, alongside Sarychat-Ertash, is Naryn, less than a hundred miles north of the Chinese border. Rangers, despite being paid the equivalent of \$40 a month, are well-known for their commitment to the land. A few years ago, the director single-handedly created a museum devoted to indigenous animals, and he has poured the resulting funds (along with proceeds from a nearby red deer farm) directly back into the reserve.

I traveled to Naryn with Rosen, Askar and Zairbek to meet with the Naryn rangers. It had been a month or so since Rosen had been in touch with the team, who had set a series of Panthera-purchased camera traps in the surrounding hills, and she was keen for an update.

Our horses were a few hands taller than ponies but more nimble than the average American thoroughbred, with manes that the rangers had tied up in elaborate braids. Rosen grew up riding—as a teen she'd competed in dressage, and had briefly contemplated a career as a professional equestrian—and she was assigned a tall stallion with a coat that resembled crushed velvet. I was given a somnolent-looking mare.

I locked my left foot in the stirrup and swung myself up over the saddle, which was pommel-less, in the manner of its English counterpart, and set atop a small stack of patterned blankets. The horse shimmied, nosed at the bit, sauntered sideways across the road and was still. Hanging from the saddle was a tasseled crop, which could be used if my heels failed.

We set off in midafternoon, following a narrow track into the hills. The higher we climbed, the deeper the snow became, and at periodic intervals the horses would fall through the top crust with a terrified whinny, pinwheeling their legs for traction. Then their hooves would lock on firm ground and they'd surge forward, in a motion not unlike swimming, and their gaits would once more level out. Soon my mare's neck and withers were frothed with sweat.

Approaching 10,000 feet, we were suddenly greeted by a flood of horses,



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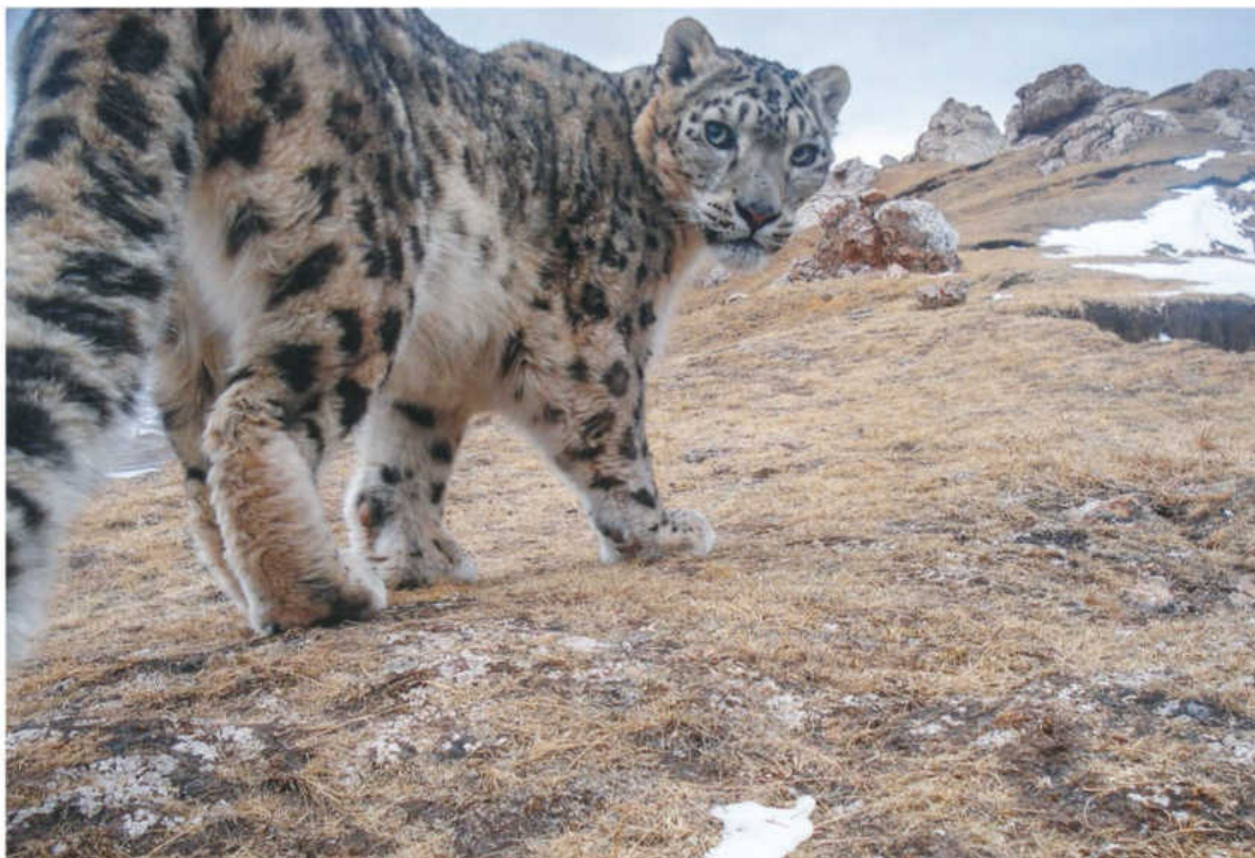
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Although fierce hunters—a “near-mythic beast,” as Peter Matthiessen put it—snow leopards are the size of German shepherds. Images of the cats in the wild come primarily from camera traps, like the one above.

saddleless and without bridles, coursing down the opposite slope in our direction. Our mounts grew skittish, and for a moment it looked as if we’d be driven backward off the cliff, but at the last moment a Kyrgyz cowboy appeared from the east, clad in a leather jacket and a traditional peaked Kyrgyz hat, and cut the horses off before they could reach us.

I listened to Zholdoshibek Kyrbashev, the reserve’s deputy director, and Rosen speaking in Russian; Zairbek, riding next to me, translated in his beginner’s English. Zholdoshibek believed there were at least a dozen snow leopards in the reserve—although the photo evidence was scant, the rangers had found plenty of scat. Rosen promised to try to provide the rangers with more cameras. Next they discussed the possibility of trapping and collaring some of the local bears, in order to get a better understanding of their behavior and movements. “It’s a great idea—but you’ll be careful,” Rosen chided him.

Zholdoshibek nodded, and smiled shyly. Like all the Kyrgyz scientists

and rangers I met, he clearly liked Rosen immensely, and more than that he seemed to trust her—there was no guile to her, no arrogance. I thought of something that Tom McCarthy, of Panthera, had told me. “You look back to the 1980s, the early 1990s, and you could count the number of people studying the snow leopard on two hands,” he said. Now there were hundreds around the world, and, he went on, “Tanya has become one of the most prominent figures—she’s just absolutely superb at what she does: At the politics of it, at the fieldwork. She’s smart, but she’s always listening.”

The sun was now almost extinguished. We wheeled in a circle along the slope and descended into a valley. In the distance, a scattering of rocks materialized; the rocks became houses; the

houses became a village. We dropped in on Beken, a veteran ranger at the reserve. He was a large man, with a face creased by the sun and wind and hands the texture of a catcher’s mitt. As we talked, his 5-year-old daughter climbed into his lap and, giggling, pulled at his ears.

Beken kept talking: He had many plans for the reserve. He wanted Naryn to become an international tourist attraction. He wanted more red deer. He wanted a bigger staff. And above all, he wanted to ensure that the snow leopard would never disappear from this land, which had been the land of his grandfather and father, and would be the land of his daughter.

“The snow leopard,” Beken said, “is part of who we are.”

It took two days to drive back to Bishkek. The highway was full of curiosities: telephone poles topped by storks’ nests; a man with what appeared to be a blunderbuss, taking aim at a scattering of songbirds. After a week in the mountains, the Irish green of the

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pastures looked impossibly bright, the Mediterranean blue of the Naryn River incandescent.

In Bishkek, with its unlovely Brutalist architecture, a fresh rainstorm arrived; the rain turned to pellets of ice. In the markets, vendors ran for cover. Behind us, shrinking in the Land Cruiser's side-view mirrors, were the Tien Shan, wreathed in fog.

A few weeks after I returned to the United States, I heard from Rosen, who had sad news: Beken, the ranger at Naryn, had been retrieving a memory card from a camera trap when the river swept him away. His colleagues found him weeks later. He left behind his wife and children, including the young daughter I had watched yank at his ears. It was stark evidence of the dangers, and the cost, of the work Rosen and her colleagues choose to do.

Then, in the fall, came happier news: Working with the Snow Leopard Trust and its local affiliate, the Snow Leopard Foundation, Kyrgyzstan, Rosen and her team at Panthera had set ten snares in the canyons of the Sarychat-Ertash Reserve. "For weeks nothing happened," Rosen wrote to me. "But on October 26, the transmitter attached to one of the traps went off. At 5 a.m., the team picked up the signal and within one and a half hours reached the site."

There they found a healthy female snow leopard. The scientists darted the cat and attached a collar fitted with a satellite transceiver. It was the first time a snow leopard had ever been collared in Kyrgyzstan—a development that will shed light on the animal's habits and range, and its relationship with the local ecosystem. Does the Kyrgyz snow leopard wander more widely than its counterparts in Nepal and elsewhere? Does it hunt as often? How frequently does it come close to human settlements?

Already, Panthera has found that the leopard is a mother to three cubs, who have been captured on camera traps. For now, Rosen and her team are calling the leopard Appak Suyuu, or True Love.

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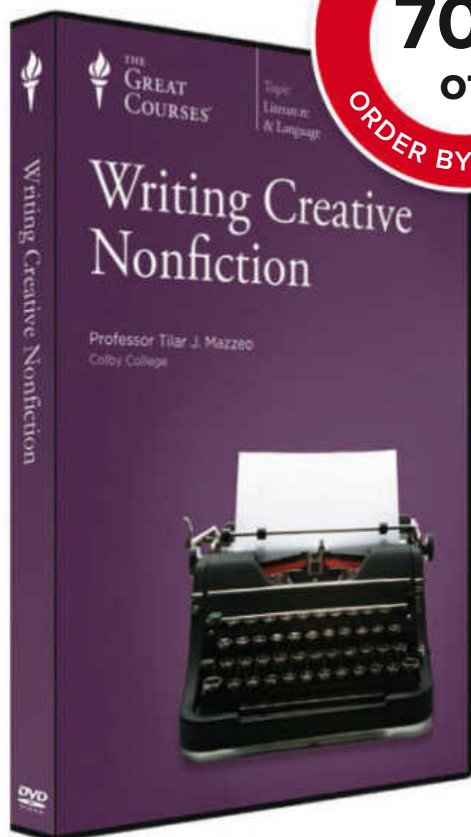
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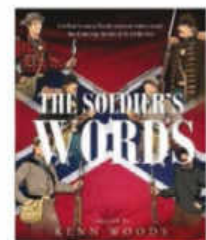
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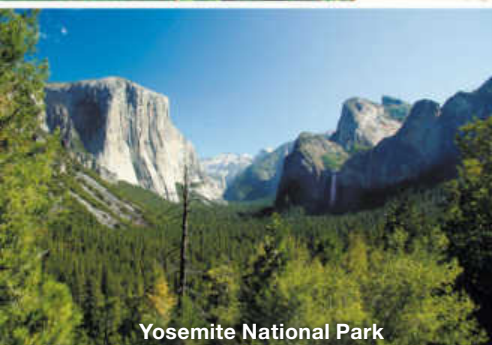
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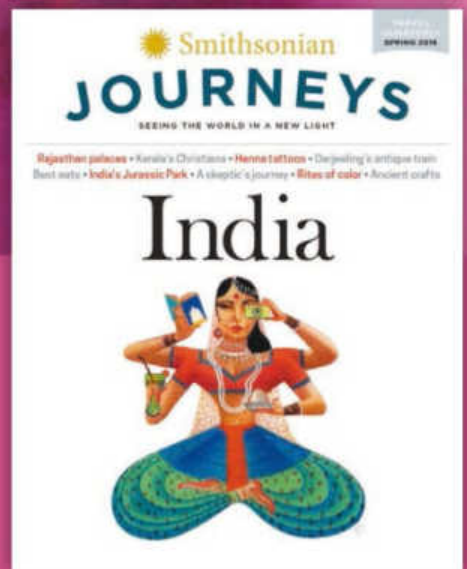
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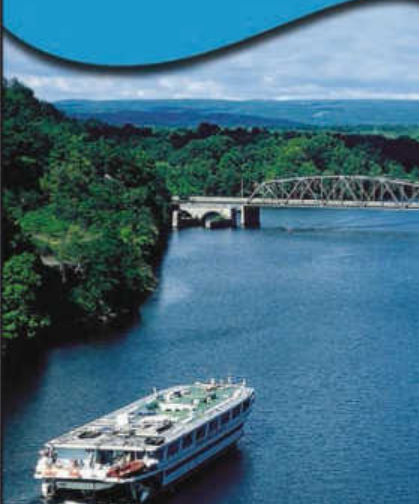
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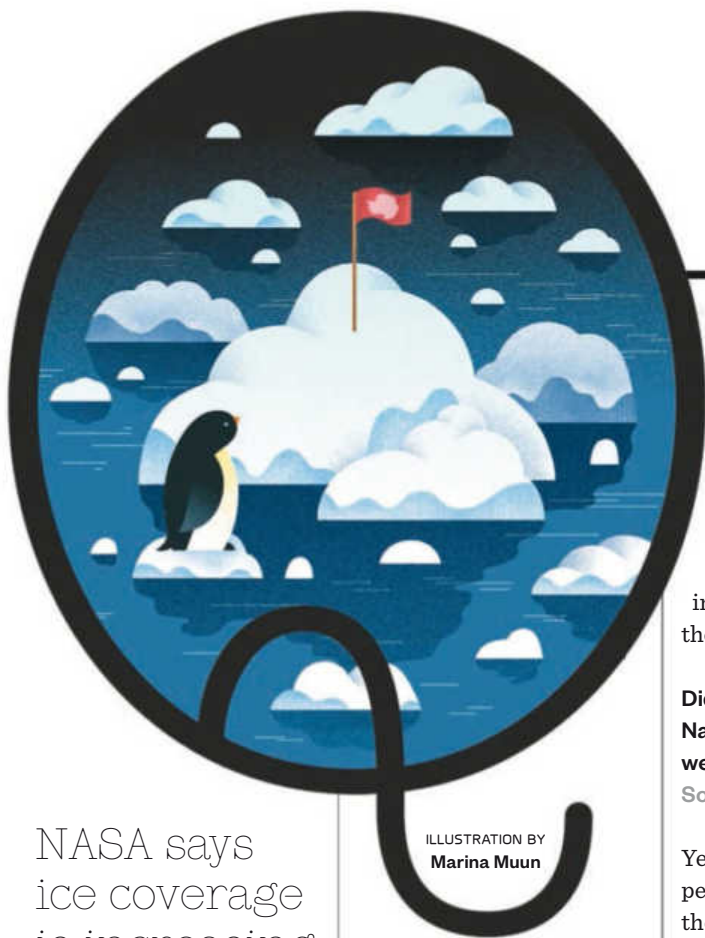


ILLUSTRATION BY
Marina Muun

NASA says ice coverage is increasing in Antarctica. How is this possible with global warming?

Kimmiss Brady,
Santa Ynez, California

As global average temperatures rise, not all parts of the planet will see the same effects, says *Andrew Johnston, geographer at the Air and Space Museum*. Some areas can even see cooling periods. Last year, the warmest on record, Antarctica had the most ice coverage it's had in 30 years. Yet the Arctic Ocean is losing ice cover almost three times faster than the Antarctic is gaining

it. Possible causes for the temperature differences involve changes in snow-fall, winds and ocean circulation patterns.

What is the origin of the term "Jim Crow era" or "Jim Crow laws"? Karen Kegg,
Santa Barbara, California

Jim Crow was a fictional character developed in the late 1820s by the white entertainer Thomas D. "Daddy" Rice, who said he was inspired by an elderly black man singing a song titled "Jump Jim Crow," says *Bill Pretzer, senior history curator at the National Museum of African American History and Culture*. After Rice became internationally known for performing the dimwitted, enslaved

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black character, "Jim Crow" became a derogatory term for African-Americans. In the 1870s and '80s, it was applied to anti-black laws and practices in the South. The phrase "Jim Crow law" appeared in print as early as 1892, in the *New York Times*.

Did any pre-Columbian Native American tribes dig wells? Dennis Perry,
Soda Springs, Idaho

Yes, Native American peoples dug wells thousands of years ago, according to *Dennis Stanford, anthropologist at the Museum of Natural History*, who helped excavate a well in New Mexico dating back some 13,500 years—the oldest well found in the Americas. Evidence of pre-Columbian wells has been found elsewhere in New Mexico and in Texas.

I've read that the earthworm is not indigenous to the United States. Is that true?

Molly Chatterton,
Shaftsbury, Vermont

No. Earthworms are native to the United States, says *Melissa McCormick, ecologist at the Smithsonian Environmental Research Center*, but the earthworms in some northern parts of the country (in-

cluding Vermont) aren't indigenous. Thousands of years ago, glaciers that covered North America and reached as far south as present-day Illinois, Indiana and Ohio wiped out native earthworms. Species from Europe and Asia, most likely introduced unintentionally in ship ballast or the roots of imported plants, have spread throughout North America.

Science fiction movies often show spacecraft with flames shooting from their engines. Is that possible, given the lack of oxygen in space?

Jeffrey Harris, Rancho Santa Margarita, California

Actually, it is. The flame that comes out of the engine nozzle is the result of the combustion of liquid fuel (typically kerosene or hydrogen) and liquid oxygen stored in tanks in the spacecraft, says *Tom Lassman, curator at the Air and Space Museum*. Combustion produces thrust, which propels the craft and is visible as a bright flame.

TEXT BY **Katie Nodjimbadem**



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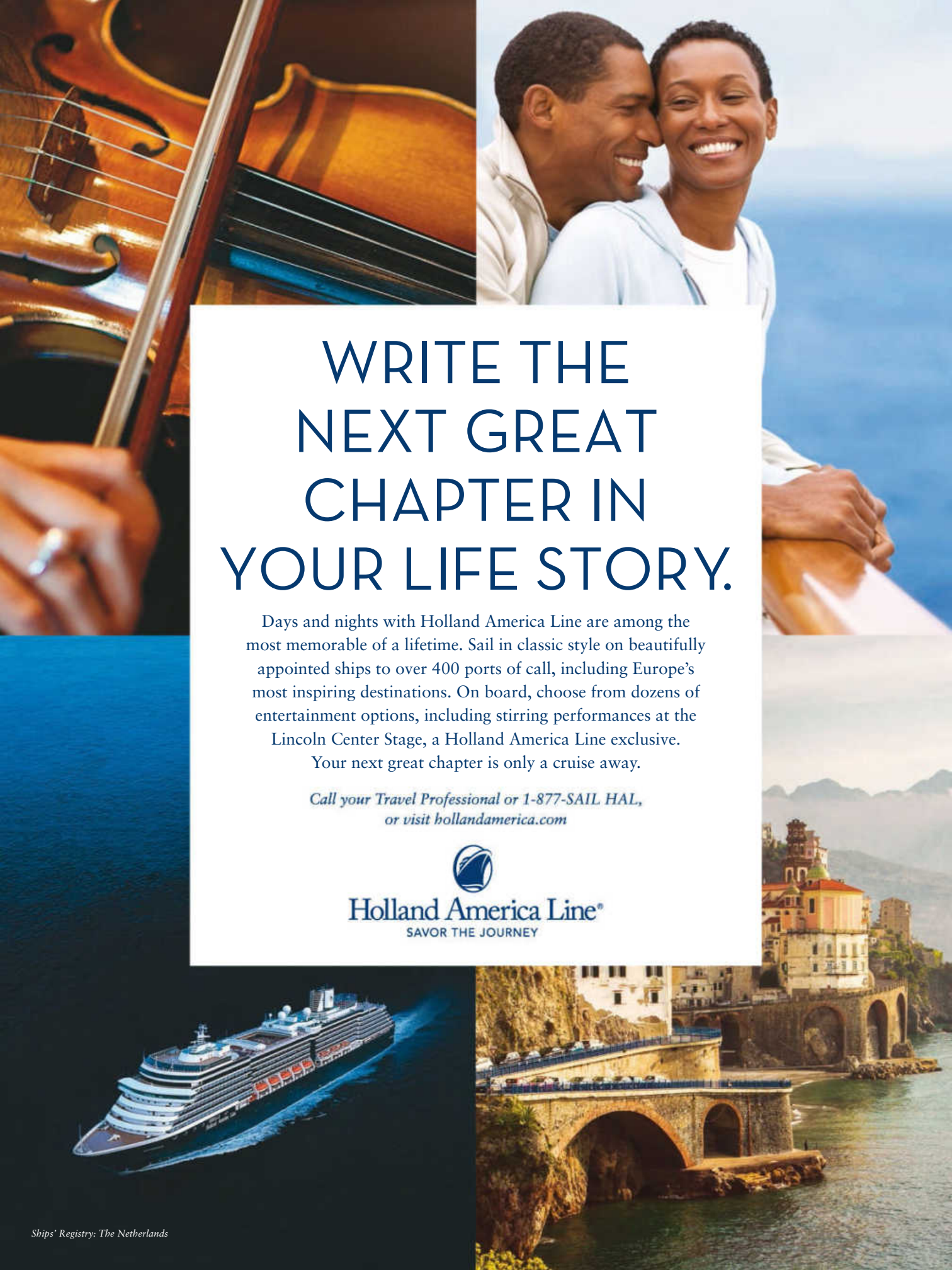
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